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a quarterly journal of

PLANNING, HOUSING & PUBLIC UTILITIES

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"WHATEVER MAY BE THE LIMITATIONS WHICH TRAMMEL INQUIRY ELSEWHERE WE BELIEVE THE GREAT STATE UNIVERSITY OF WISCONSIN SHOULD EVER ENCOURAGE THAT CONTINUAL AND FEARLESS SIFTING AND WINNOWING BY WHICH ALONE THE TRUTH CAN BE FOUND."

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1958

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Measurement of Recreation Benefits

By ANDREW H. TRICE* *and* SAMUEL E. WOOD**

EFFORTS to place quantative measures on recreation values have been common since this function was recognized as a public responsibility. None of these attempts, however, have completely satisfied their proponents or fully met the objections of affected interests and agencies. The responsibility to place such values on recreation benefits was boldly assumed by the California State Department of Water Resources through the necessity to evaluate some five reservoirs in the Upper Feather River Basin, several of which were planned primarily for recreation use. Pressures to make such evaluations adequate to determine economic feasibility of the use of this water for recreation purposes was further found in the current controversy over the division of California's waters between the water-producing areas and the areas of deficiency. The interest in the upper basins throughout the "areas of origin" is that waters in these areas should be dedicated to the development of the basins' natural resources before export to areas of deficiency. The problem faced by economists and planners is the lack of appropriate economic tools with which to measure benefits gained from the use of water in developing particular local resources.

Illustrative of the need is a lack of measures in economic terms for the relatively non-consumptive uses of water on marginal land and for recreation and fish and wildlife benefits. It is imperative to measure the values developed through water use in the upper basins for comparison with values historically measured in such analyses, including water used for domestic, industrial, agricultural and power purposes. Pressures on existing recreation facilities throughout the United States have far exceeded capacity and, as a consequence, the need for additional capacity has been so evident that economic evaluation by some responsible agencies has appeared unnecessary.

After the Department of Water Resources published its report on the Upper Feather River investigation in February 1957[1], a report which contained an out-

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[1] State of California, *Investigation of Upper Feather River Basin Development, Interim Report on Engineering, Economic and Financial Feasibility of Initial Units*, Department of Water Resources Bulletin No. 59, Sacramento, California, July 1957. The economic evaluation of the recreation benefits attributable to public recreation development and the methodology described in this paper and utilized in *Appendix A* of the *Report* were prepared by Pacific Planning and Research (formerly Harold F. Wise and Associates), Sacramento, California under contract with the California State Department of Water Resources.

line of methodology and the designation of dollar values for a per capita day of recreation, the Army Corps of Engineers and the National Park Service both indicated that such types of per capita day quantative values for recreation benefits should be utilized for the economic analysis of recreation benefits derived from reservoir developments. The rationality behind this decision was developed in the public hearings conducted by Senator Robert Kerr of Oklahoma as chairman of the subcommittee on Public Works.[2] Testimony revealed that failure properly to estimate recreational potentials of reservoir projects had led to dangerous overcrowding with, in many cases, actual recreation use in the first year far exceeding facilities provided. It was also shown that many reservoir projects which had been rejected on the basis of comparisons of non-recreational benefits and costs alone, might have been justified if reasonable dollar allowance had been made in benefit-cost computations for potential recreation use. To minimize the dangers of inadequate recreational features in connection with future reservoirs and to demonstrate the feasibility of projects which have substantial recreational potentials, a proposal that the evaluation of recreation benefits be required as an integral part of project planning is being introduced into the Senate.

1. The Problem

Unfortunately, the reasons for not including quantative recreation evaluation as an integral part of feasibility reports in the past are not entirely legal in nature. Rather, they have stemmed for the most part from difficulties in appraising the value of recreation. And, in addition, since it appears impossible or undesirable to charge for recreational use, there seemed to be no particular advantage in attempting to estimate in detail such values. In the past, where major multipurpose projects have been undertaken, irrigation, power development, and other benefits which lend themselves more readily to dollar evaluation and for which reimbursement can be expected, have far outweighed any estimates made of possible recreational value. However, failure to make adequate provision for recreational development in connection with projects justified on non-recreational bases and failure to undertake worthwhile projects where specific consideration of recreational values would have made a difference, indicate the need to implement the bill mentioned above by finding a method or methods of evaluation which will make possible the inclusion of recreational values among those to be considered in project selections.

The assignment of dollar values to recreational benefits is of paramount importance in connection with the proposed reservoirs in the Upper Feather River Basin. It is anticipated that a substantial part of the project values for several of the reservoirs will be recreational in nature. Without dollar values for recreational benefits, certain of the projects might not be economically feasible, since total costs might be greater than the total of non-recreational benefits. In addition, a benefit-cost computation is needed which includes recreational benefits and costs if ratios for Upper Feather River projects are to be comparable in dollar terms with other uses of state funds and if a priority list is to be made for the several contemplated reservoirs within the area itself.

(a) *Primary and Secondary Benefits Distinguished.* Benefits from reservoir projects are of two kinds: primary and

[2] See "Evaluation of Recreational Benefits from Reservoirs," *Hearings Before a Subcommittee of the Committee on Public Works*, United States Senate, Washington, D. C., 1957.

secondary. Primary benefits arise directly from the project itself; secondary benefits are those which follow the impact of primary benefits. An example of primary benefits are net benefits accruing to farmers from irrigation water supplied by reservoir projects. Secondary benefits are either induced by the primary benefits or stem from them. Illustrative of induced secondary benefits are those received by businesses which secure increased supplies of raw materials, or raw materials at a lower price; while secondary benefits stemming from the project include those accruing to the business community due to increased expenditures by the farmers receiving the primary benefit.[3]

According to the principles developed by the Federal Inter-Agency River Basin Committee in its report on *Proposed Practices for the Economic Analysis of River Basin Projects*, only primary recreational benefits are to be considered in connection with multipurpose projects. The same limitation applies to non-recreational project benefits also and is not, therefore, a restriction applied to recreational benefits alone.[4] Although it cannot be said that there is unanimous agreement among analysts as to the desirability of focusing attention upon primary benefits alone, there is a very strong sentiment in that direction. It is believed, for example, that secondary benefits tend to overlap primary benefits with resulting double counting of benefits. Further, since many factors contribute to business growth and prosperity, there exists the danger that benefits of the secondary type may be attributed to a project when they are really attributable in whole or part to something else. When there is added to the danger of double counting and possible improper credit of benefits the very great difficulty of estimating secondary benefits and the widespread suspicion of such figures when they have been estimated, there appears to be ample grounds for avoiding the computation of secondary benefits wherever possible.

Professor Wantrup of the University of California clarifies the issue when he suggests that computation of primary benefits is sufficient where the problem is the selection of a project.[5] Only when repayment of costs is expected would Professor Wantrup resort to the computation of secondary benefits. If his line of reasoning is adopted, and it does appear to have practical value, only primary benefits need be considered in connection with the Upper Feather River reservoirs since project selection or justification is under consideration and direct repayment by recreationists or local business interests is not contemplated.

(b) *The Nature of Primary Benefits.*[6] Primary benefits from recreation are personal and varied and, therefore, not readily measurable in dollar terms. This fundamental tenet is concurred in by virtually all persons who have given the problem careful consideration.[7] On the basis of this major premise it would appear that attempts to place dollar values on recreation should be abandoned. As a matter of fact there are those who advocate this course of action not only because of the seeming impossibility of

[3] See Federal Inter-Agency River Basin Committee, Subcommittee on Benefits and Costs, *Proposed Practices for Economic Analysis of River Basin Projects*, (Washington, D. C.: May 1950) pp. 7-11; 35-36, 39-40. See also S. V. Ciracy-Wantrup, "Benefit-Cost Analysis and Public Resource Development," *Journal of Farm Economics*, November 1955, and miscellaneous unpublished writings of Professor David Weeks, Giannini Foundation for Agricultural Economics, University of California.

[4] Subcommittee on Benefits and Costs, *op. cit.*, p. 11.

[5] Ciracy-Wantrup, *op. cit.*, p. 688.

[6] Subcommittee on Benefits and Costs, *op. cit.*, pp. 51-52.

[7] *Ibid.*, p. 51. See also Land and Recreational Planning Division, National Park Service, *The Economics of Public Recreation*, The "Prewitt Report," Washington, D. C., 1949, p. 30; Kenneth Decker, *Evaluation of Public Recreation*, Sacramento, California, (reproduced by State of California Recreation Commission, 1951) p. 1.

the task, but because it is their belief that even the most optimistic estimates will understate true recreational values, thus leading to their disparagement as compared with non-recreational values.[8] The United States Forest Service has refused, for example, to place dollar values on recreational use of the forests under its jurisdiction. The Forest Service has been able to live with this policy, however, only because it need not resort to dollar comparisons to justify its program.

If recreational benefits to the individual are personal and varied and therefore largely intangible, how is it possible to express them in dollars? Very generally, the expression of intangible values in dollars calls for the derivation of "judgment values."[9] The "Prewitt Report" of the National Park Service concluded that, if the interests of the Park Service require intangible benefits be expressed in dollars, such dollar values were to be based upon the best judgment of those most competent to evaluate such intangibles. The Inter-Agency River Basin Committee recommended the simulation or estimation of at least minimum values for intangible benefits, valuing them "as if" they were products exchanged in the market place.[10] Over and above minimum values expressed in dollars, the Inter-Agency Committee recommended that residual intangible benefits, values which continued to defy evaluation in money terms, be described generally so that their existence and importance is not overlooked.

Specific recommendations in the Prewitt Report on methods to be employed in estimating market values include those of Professor Howard Ellis of the University of California and those of Professor Harold Hotelling of the University of North Carolina. Professor Ellis suggested that recreational benefits be derived by assuming dollar values in terms of what a monopolist would charge if he were to control the recreational area.[11] Professor Hotelling suggested that a study be made of distances travelled by those using the national parks to determine the cost of such travel and, by comparing costs incurred by those travelling the greatest distances, to determine the dollar saving of all those able to enjoy the parks without incurring the full travel expense of the most distant travellers.[12] Both of these suggestions involve the concept of a "consumer surplus" or a free value associated with payment of prices below what an individual would be willing to pay. An adaptation of Professor Hotelling's idea will be developed at a later point in connection with procedures utilized to measure recreational values in the Upper Feather River Basin.

2. *Current Methods of Valuing Recreation Benefits*

Two principal methods of estimating dollar values for recreation are in current use in national parks and in evaluating multipurpose reservoir developments.[13] One is based upon *expenditures* by users of recreation facilities while the other is

[8] National Park Service, *op. cit.*, p. 6.

[9] *Ibid.*, p. 30.

[10] *Ibid.*, p. 51. Although market values would be simulated, the values would actually lie outside the market and would be "extra market" in nature. See also "Evaluation of Recreational Benefits from Reservoir," *Hearings Before a Subcommittee of the Committee on Public Works*, *op. cit.*, pp. 119-123.

[11] *Ibid.*, p. 6. Something similar to what Professor Ellis suggests can be accomplished by the method proposed later in this study. The problem is to find a method for determining what a monopolist would charge if he were a mind reader as well as a monopolist.

[12] *Ibid.*, pp. 8-9.

[13] Robert F. Wallace, *An Evaluation of Wildlife Resources in the State of Washington* (Pullman, Washington: Bureau of Economic and Business Research, State College of Washington, February 1956), pp. 1-5 for an explanation of expenditure approach.

See National Park Service, "A Method of Evaluating Recreational Benefits for Water Control Projects," *Washington, D. C.*, February 16, 1950, for an explanation of cost approach.

based upon *costs* of providing recreation facilities.

(a) *Expenditure Approach to Estimating Recreational Benefits.* The expenditure approach assumes that dollars spent for recreation by those persons engaging in it are appropriate measures of recreational benefit. Results of sample studies of actual expenditures by recreationalists of various types at different times and in different places are shown in Table I.

TABLE I—EXPENDITURES OF TOURISTS AND RECREATIONISTS

	Average Per Day Expenditures
Hunters in United States (arith. av.) 1955[1]	$ 5.52
Fishermen in the U. S. (arith. av.) 1955[1]	4.82
Recreationist in United States 1956[2]	6.00
Recreationist in Central Valley Area 1955[3]	6.00
Bass Angler 1953[4]	9.00
Salmon Angler 1953[4]	16.00
Steelhead Anglers 1953[4]	18.00
Tourist day (Southern California Winter)[5]	10.01
1953 (Southern California Summer)[5]	11.06
(Northern California)[6]	9.96
Tourist 1938[6]	7.00
Hawaiian Tourist (one to 90 days)[7]	28.00
1953 (91 to 365 days)[7]	10.30
(passing through)[7]	18.50
Angler expenditures, 1956[8]	7.64
Non-Angler expenditures, 1956[8]	6.54
Utah motoring tourist 1948[9]	10.53
Montana tourist 1955[10]	7.72
Texas tourist 1955[11]	7.53
Colorado resident 1953[12]	5.32
Non-Colorado tourist in Colorado, 1953[12]	8.06
Colorado Tourist, 1955[13]	6.90
Colorado 1954[14]	8.03
California 1953[15]	10.25
Utah, 1954[15]	9.70
Texas, 1954[15]	7.80
Wyoming, 1953[15]	7.15
South Dakota, 1954[15]	6.85
Montana, 1954[15]	6.66
Arizona, 1953[15]	6.26
Nevada, 1952[15]	6.14
New Mexico, 1953[15]	6.20
Oregon, 1953[15]	5.36
Washington 1952[15]	5.25
Kansas, 1952[15]	3.89
Tennessee, 1953-1954[16, 15]	6.00

According to these data, average expenditures in continental United States ranged from a low of $3.89 per day in Kansas in 1952 to $18.00 per day for steelhead anglers in California in 1953. An array of these average expenditure figures for the United States reveals that the greater number of per visitor day expenditures ranged from $6.00 to $10.00 with an interpolated median average of about $8.70. In California the most common figures ranged from $6.00 to $11.00 per visitor day. On the basis of these figures, it appears a representative gross expenditure for recreation in California lies somewhere between $8.00 and $9.00 per day.

The expenditure approach is not a satisfactory method for measuring the intangible values to the person enjoying recreation. In the first place, many so-called recreational expenditures are normal expenditures made under slightly

[1] United States Department of the Interior, Fish and Wildlife Service, *National Survey of Fishing and Hunting*, 1955 (Washington, D. C.: U. S. Government Printing Office, 1956), p. 28.

[2] United States Department of the Interior, Bureau of Reclamation, *Reclamation's Recreational Opportunities* (Washington, D. C.: Department of the Interior, June 1956).

[3] Bureau of Reclamation, *The Contribution of Irrigation and the Central Valley Project to the Economy of the Area and the Nation* (Washington, D. C.: U. S. Government Printing Office, 1956), pp. 34-35.

[4] David E. Pelgen, "Economic Values of Striped Bass, Salmon, and Steelhead Sport Fishing in California," *California Fish and Game*, January 1955, pp. 5-17.

[5] Kenneth Decker, *The Tourist Trade in California* (Berkeley, California: Bureau of Public Administration, March 1955), p. 16.

[6] James P. Pope, *Recreation*, Speech before the Florence, Alabama, Rotary Club, September 11, 1939.

[7] John Child and Company, *The Impact of Visitor Dollars in Hawaii, 1953* (Honolulu: Hawaii Visitors Bureau, 1955).

[8] Unpublished figures based on sample interviews in Plumas County.

[9] Division of Highway Planning, *Utah Tourist Study* (Salt Lake City: Utah State Road Commission, 1950), p. 7.

[10] Advertising Office, *The Montana Tourist Survey, 1955* (Helena, Montana: Montana Highway Commission, 1956), pp. 4 and 5.

[11] Information and Statistics Division, *On the 1955 Texas Tourist Industry* (Austin, Texas: Texas Highway Department, 1956).

[12] L. J. Crampon and F. W. Ellinghaus, *1953 Colorado Statewide Summer Tourist Survey* (Boulder, Colorado: The Bureau of Business Research, University of Colorado, December 1953), p. 27.

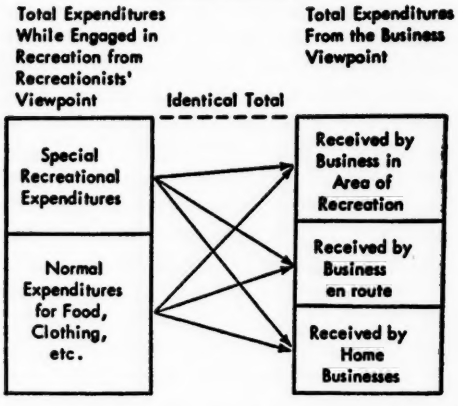
[13] Bureau of Business Research, *The Tourist and Colorado* (Boulder, Colorado: University of Colorado, February 1956), pp. 37-38.

[14] Lewis C. Copeland and I. James Pikl, *Estimating Tennessee's Tourist Business* (Nashville, Tennessee: Department of Conservation, 1954), p. 6.

[15] Lewis C. Copeland, *Tennessee Tourist Trade in 1954* (Nashville, Tennessee: Tennessee Department of Conservation, September 1955), pp. 6-7.

different circumstances. For example, a substantial portion of food, clothing, and travel expenditures would have taken place in the absence of recreation, simply as a part of daily living. (See Plate 1).

PLATE I—NORMAL AND SPECIAL EXPENDITURES BY RECREATIONISTS AND THEIR GEOGRAPHICAL IMPACT ON THE BUSINESS COMMUNITY

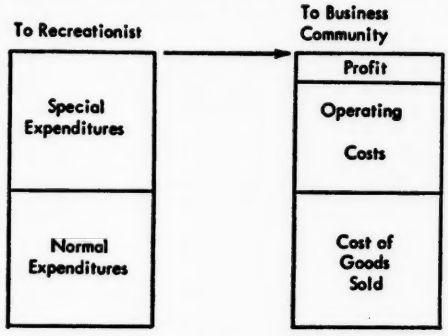

Total Expenditures While Engaged in Recreation from Recreationists' Viewpoint
Identical Total
Total Expenditures From the Business Viewpoint
Special Recreational Expenditures
Normal Expenditures for Food, Clothing, etc.
Received by Business in Area of Recreation
Received by Business en route
Received by Home Businesses

And, in the second place, even those expenditures which are over and above normal living costs are not necessarily measures of recreational enjoyment, but are the price paid for certain goods and services for which there are established market values. *Dollars spent in pursuit of recreation appear to be more significant as indicators of secondary benefits to the business community than as measures of primary recreational benefits.*[14]

Even when used as indicators of secondary benefits to the business community, recreational expenditures constitute gross or total dollars rather than the increase in net income to business. Their use as measures of secondary benefit tends, therefore to overstate even their importance to the business community (See Plate 11). Gross recreational expenditures are rejected as being inappropriate measures of either personal recreational enjoyment or community benefits of a secondary type.[15]

(b) *Cost Approach to Estimating Recreational Benefits.* The second method currently used for estimating recreational values is associated with multipurpose reservoir projects for the most part and may be described as the cost method. The most notable use of costs as a measure of recreational benefits is found in the computations of the Bureau of Reclamation. The Bureau staff customarily estimates costs of recreational developments and then assigns an equal amount to recreation benefits. In some instances, however, the Bureau uses benefit figures supplied it by the National Park Service.[16] The National Park Service uses

PLATE II—TWO VIEWS OF RECREATIONAL EXPENDITURES AND THEIR SIGNIFICANCE TO THE BUSINESS COMMUNITY



[14] It would be possible and profitable to estimate the effect upon the business community of Plumas County of new dollars generated by increased recreational activities resulting from the proposed projects. For an excellent analysis of tourist expenditures and their effects upon an economy, see John Child and Company, *The Impact of Visitor Dollars in Hawaii* (Honolulu: Hawaii Visitors Bureau, March 1953).

[15] During the past year the National Park Service has developed a $1.60 per day value of recreation in National Parks. From explanations found in Park Service releases and in other references to it, the $1.60 appears to be based upon a study limited to expenditures by people engaging in recreation similar to that provided in National Parks. See August 1956, release of National Park Service entitled, *A Method of Evaluating Recreation Benefits and Costs of Water Control Projects.* See also the hearings of Subcommittee on Public Works, *loc. cit.*, and S. J. Dana, *Problem Analysis Research in Forest Recreation* (Washington, D. C.: Forest Service, United States Department of Agriculture, April 1957), p. 13.

[16] See Bureau of Reclamation, San Luis Unit, *Central Valley Project*, Sacramento, California, May 1955, pp. 115-124; and Bureau of Reclamation, *Ventura River Project*, Sacramento, California, p. 149. See also Alfred R. Golge, *Reclamation in the United States* (New York: McGraw-Hill Book Company, 1952), pp. 127-128.

costs also as the basis for determining benefits although the benefits attributed to recreation by it are twice as large as the estimated costs. The reason for the difference is found in its practice of considering primary benefits equal to costs and secondary benefits equal to primary benefits. Thus, benefits are always twice as great as costs in National Park Service calculations.

The use of costs as a basis for estimating benefits involves circular reasoning. There appears to be nothing gained by assuming a constant relationship between benefits and costs. Obviously, the reason for estimating benefits in the first place is to decide economic feasibility or, in other words, whether costs should be incurred at all. To assume that benefits are equal to or twice as great as costs in every case is to make all recreational projects feasible. In addition, if the ratio of benefits to costs are equal for every project, there is no basis for establishing priorities among projects.

Even though the assignment of benefits on the basis of costs involves circular reasoning and is open to serious question where recreation is a major factor in a multipurpose project, it should be understood that recommendations as to recreational developments and therefore recreational costs, are based upon "value judgments" of persons trained to appraise the need for and probable use of recreational facilities. If recommendations as to recreational features are the result of careful analysis of all pertinent factors including accessibility, topography, probable development, population growth and service area, it would appear reasonable to assume that the recreational features of the project would be worth at least what they cost or even twice that amount. Nevertheless, it appears that the cost method has not proven adequate in the past. Certainly, failure to plan recreational facilities, at least to equal the demand later realized, has been typical rather than exceptional in connection with projects completed during the time the cost method has been the accepted practice.

3. *Method Recommended for Use in the Upper Feather River Basin Study*

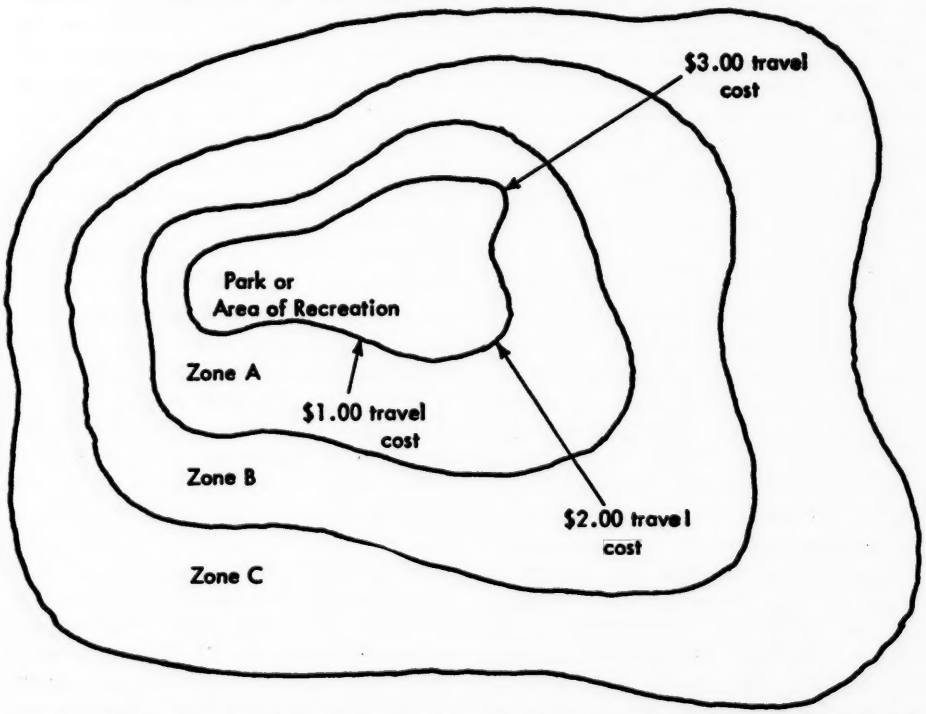
Thus, no method currently used in approximating recreational values is entirely acceptable in evaluating recreation benefits on the Upper Feather River projects. To a greater or lesser degree the dollar values cited, under both the expenditure and cost methods, must be rejected. *Not only must the popular current methods be rejected, but it is doubtful that any completely satisfactory method can be developed since the values under consideration are largely intangible.* It is against this background that the method proposed in the pages which follow must be evaluated. In essence, a practical problem demands a practical solution, a solution which in the very nature of the case cannot be perfect.

For the method proposed to be useful it should provide a value which has the following general characteristics: (1) It is in terms of a standard unit of time and is expressed in dollars. (2) It is representative of recreational enjoyment for which there is no expenditure by the recreationists and for which the state is not directly reimbursed. (3) It is separately derived and independent of costs of providing recreational facilities. (4) It consists of a single figure which applies to recreationists in the Upper Feather River area as a group without regard to the form of recreation being enjoyed or to differences among individuals as to capacity to enjoy recreational benefits. (5) It is peculiar to the area under consideration, even though similar areas may have similar values. (6) It is reasonable

in amount and subject to tests based upon judgment values by informed people.

(a) *The Nature of the Travel Cost Approach.* The approach suggested by Professor Hotelling in his letter to the National Park Service most closely resembles that to be proposed here. According to his method an analysis of National Park patronage would be made to discover the points of origin of recreationists coming to a given park. Such recreationists would be grouped geographically into distance zones about the park. The average costs of travel to the park for each such group would be multiplied by the number of potential users within each zone. (See Plate 111). Those visiting the park from the most distant zone would set a bulk-line value of recreation provided by the park. A market value having been set it would be possible to compute the free value of recreation provided to those who do not have to travel so far. A total figure for free recreational value attributable to the park would be a summation of travel cost differences between the maximum or bulk-line cost and that for each other

PLATE III—Travel Cost Analysis of Recreational Benefits
(A Representation of Professor Harold Hotelling's Concentric Travel Cost Zones) *



* According to Professor Hotelling's suggestion, population around a national park (or recreational area) would be identified in terms of average cost of travel to the park. Concentric circles or zones would include each group having similar costs. The consumer surplus of each zone would be determined by first subtracting its average cost from the average cost of the most distant (and most costly) travel group or zone then multiplying that figure by the number of persons in the zone likely to visit the park during any given period of time. For example, the highest travel cost is $3 for persons residing in Zone C. The travel cost from Zone A is $1. Within Zone A there are 1 million persons, ten percent of whom will visit the park during the given time period. The total consumer's surplus for Zone A is therefore 100,000 times $2, or $200,000 for the time period.

zone, multiplied by the number of recreationists estimated to use the park from each zone.

In Professor Hotelling's approach it is assumed that people enjoy parks to a similar if not identical extent. Therefore, if those visiting a park from the greatest distance pay for the privilege in travel expenses as much as $5.00, they have in effect established the value of recreation to everyone. Since all others who visit the park receive the same $5.00 of benefit, they receive recreation, in effect, at bargain rates. Thus, if it costs recreationists from the next farthest zone $4.00 on the average, each of them receives $1.00 of free benefit and similarily, if it costs $3.00 from the next zone, there is a $2.00 free benefit, and so forth. To the extent that the use of the park has been made possible by expenditure of funds by the government, the individual recreationist who does not pay the full price is subsidized by the general tax rolls. This same subsidization occurs in connection with multi-purpose reservoirs since those who pay for water and power or who pay taxes are underwriting the recreation of those directly engaged in recreation activities.

Costs of travel to and from a recreational area appear to offer the least objectional method of differentiating among recreationists as to recreational enjoyment. Using costs of travel alone avoids such questions as economic ability, personal tastes and appetites, and forms of recreation enjoyed. If, for example, food and lodging, the other major expenditures of recreationists, were to be assigned a single figure per day, differences among recreationists would be eliminated entirely and no basis for establishing a market value similar to the Hotelling travel cost figure would be possible. If, on the other hand, a fixed cost per mile of travel is assigned all recreational parties, differences of wealth or taste are eliminated, but differences in per visitor-day of travel cost remain. These differences arise from the fact that some recreationists travel a lesser distance than others, stay more days, or share expenses with more people and, in consequence, pay out fewer dollars for travel than those who travel longer distances, stay for shorter periods, or travel with fewer people sharing costs.

The assumption of a fixed cost per mile traveled has, therefore, the dual advantage of removing income differences and at the same time producing per visitor day differences in costs of enjoying a recreational area. It should be noted that recreational value of the type under consideration here exists for every recreation area with or without specific improvements. Thus the proposed reservoirs in the Upper Feather River area will not create the differences in travel costs to the area upon which recreational values are to be based, since such cost differences already exist, but they will make possible the use and enjoyment of the area by a larger number of persons than would be possible without the improvements.[17]

(b) *Specific Applications of the Recommended Method.* Plumas County and the Upper Feather River area which it includes is in the Sierra Nevada mountains northeast from Sacramento. To determine the value of a recreational day in that area it is necessary to consider actual recreational use patterns for Plumas County or for other similar areas in the High Sierras. Fortunately, data with respect to recreational use of three

[17] John Zivnuska and Ann Shideler, "A Projection of the Recreational Use of Public Forest Areas in California to 1965," *Forest Science*, September 1957. Projections for forest use in California made by Professor Zivnuska suggest that capacity to serve recreational demand is not matching growing demand. By increasing capacity in the fashion contemplated in the Feather River area the State would be helping to meet a pressing need for increased capacity to meet ever increasing demand.

areas in the Sierras have been obtained. The California Department of Water Resources gathered information by interview in the Upper Feather River area in 1956 and the United States Fish and Wildlife Service gathered data for two sections of the Truckee River in the same year. While the three areas are distinct from one another, they are all in the High Sierras and within 100 miles of one another. The three sets of data are comparable and contain as a minimum the following information: (1) Number of persons in each recreational party. (2) The city or county of origin of each party. (3) The number of days spent by each party in the area of recreation. (4) The number of days the party spent on its entire recreation trip. By use of the four items of specific information secured from each recreational party, there was computed for each of them an average cost of travel per visitor day. In making this computation, the distance travelled in going to and returning from each area of recreation was assumed to be the same for every party originating in any one county. The travelled distance was based upon actual road mileage from the county seat or center of population to the center of the area of recreation. In line with current estimates by the State of California[18] on the cost of operating private vehicles on state business the total travel rate of 6.5 cents per mile was used in basic computations.

Travellers coming from the greater distances did not spend as many days in the area as they spent on the trip.[19] These persons may be considered to have indulged to some extent in recreation along the way or in other recreational areas. In fact, in some cases the period spent in the Feather River area was only a fraction of the time spent on the trip, suggesting that alternative recreation areas were quite important. Undoubtedly, it would not be proper to consider the entire trip in such instances as for the sole purpose of enjoying recreation in the subject area. Since data as to specific recreational intent or as to other recreation enjoyed on the trip were not secured, it is assumed that a proper charge of travel cost to the area under study is the percentage of the total round trip spent in the recreational area. For example, if four people on a fourteen-day vacation trip, spent seven days in the area, fifty percent of the computed round trip cost would be divided by the total number of person days in the trip (28), to obtain the per visitor day cost of travel.

Cost per visitor day for travel by the 288 parties surveyed in the Upper Feather River area ranged down from $22.62 at the highest to $.09 at the lowest. (See Diagram 1). If a bulk-line market value is established at the 90th percentile, recreation in the area would have a per visitor day market value of $3.14, and if the median travel cost of $1.05 is taken as average for the group, a difference or free benefit of $2.09 per visitor-day results.

The Truckee River flows from Lake Tahoe to the north and east. The portions of its length which were included in

[18] Studies undertaken by the California Department of Finance indicate that 6.5 cents per mile is average cost of operating vehicles. It is assumed that average mileage per month is 1,000 miles. Since trips to and from the Sierra Nevada Recreation areas range from 1,200 miles and down, with the bulk of the travel involving 500 miles or less, the 6.5 cent figure is minimal rather than maximal.

[19] A complication which must be recognized in the Hotelling approach (and in the current analysis) is that arising from vacationists who visit or use more than one recreational area on a single trip. To what extent are travel costs to be attributed to one area as opposed to another? The problem is somewhat reduced where alternative areas tend to be near one another and have similar features. For example, travel to the Sierra Nevadas for recreation may be considered for some purposes as a single form or type of recreation. Also, the distance traveled by vacationists may indicate the extent of alternative recreation on a single trip. That is to say, cross country travelers are more apt to view several natural wonders than are those traveling a few hundred miles within a single state.

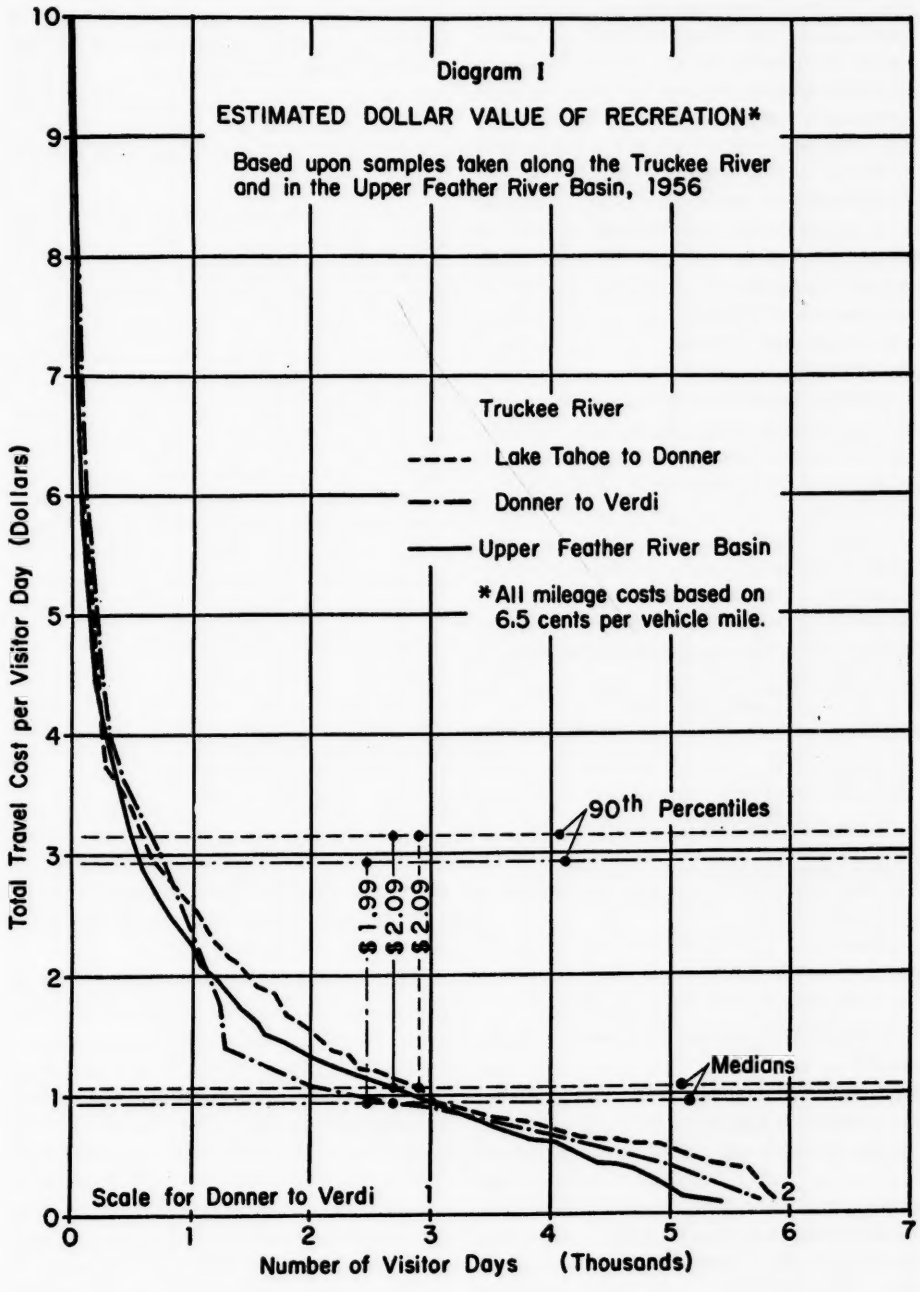


Diagram I
ESTIMATED DOLLAR VALUE OF RECREATION*
Based upon samples taken along the Truckee River and in the Upper Feather River Basin, 1956
Truckee River
Lake Tahoe to Donner
Donner to Verdi
Upper Feather River Basin
*All mileage costs based on 6.5 cents per vehicle mile.
90th Percentiles
Medians
$1.99
$2.09
$2.09
Scale for Donner to Verdi
Total Travel Cost per Visitor Day (Dollars)
Number of Visitor Days (Thousands)
0
1
2
3
4
5
6
7
8
9
10

the Fish and Wildlife Service surveys are south and east of Plumas County. Analysis of 209 parties on the Lake Tahoe to Donner Creek section of that stream provides a recreational-value of $3.15 at the 90th percentile level, a median value of $1.06, and a consumer surplus or free value of $2.09 per visitor day. Analysis of 85 parties on the Donner Creek to Verdi Diversion portion of the river, supplies figures of $2.93, $.94, and $1.99 respectively for 90th percentile, median, and free value received, by the average recreationist.

On the basis of the foregoing computation a table showing comparative recreational values has been prepared. In addition to the figures secured when a cost figure of 6.5 cents per mile is used, computations have been made on costs ranging from 5.0 cents to 7.5 cents. In summary, the three areas show a free value for a day of recreation of approximately $2.00 when 6.5 cents is used.

COMPARATIVE TABLE—DIFFERENCE BETWEEN 90TH AND 50TH PERCENTILES

	Cents Per Mile					
	7.5	7.0	6.5	6.0	5.5	5.0
Feather River.....	$2.41	$2.25	$2.09	$1.93	$1.77	$1.61
Truckee (Donner to Verdi).....	2.30	2.14	1.99	1.84	1.68	1.53
Truckee (Tahoe to Donner).....	2.41	2.25	2.09	1.93	1.77	1.61

Conclusions and Recommendations

The $2.00 figure satisfies the six criteria stated at the outset: (1) It is expressed as so many dollars per visitor day and can be compared therefore with other dollar values connected with the proposed reservoirs. (2) It represents recreational enjoyment over and above actual expenditures, an enjoyment which the state provides without specific direct charge to the recreationists. (3) It is derived without regard to costs of providing the reservoirs or any specific recreational facilities. (4) It is exclusive of differences in taste and/or wealth. (5) It is based upon data for the subject area and is, in a sense, peculiar to the area's recreational features. (6) It is reasonable in amount.

The computations of possible dollar values of recreation which have been made here involve rather broad assumptions as to the sameness or homogeniety of the members of the group under study. Included among the assumptions are similarity of intent; that is, vacationists for the most part rather than day users; distance traveled, that is, from within the state or from within 500 miles, and so forth. Although the reasonableness of the figures just cited is not based entirely or even primarily upon such assumptions, or even upon the adequacy of the samples from which the computations are made, it should be noted that assumptions at least as broad are used in projections by the Bureau of Reclamation and other official water conservation agencies on primary irrigation benefits. In such projections it is assumed, for example, that the land to be irrigated will actually be planted, that the crops grown on the land will find a market, that the prices received for the crops will be at an adequate level and that associated costs will not be too high.

The key factor in the choice of $2.00 per visitor day should be its reasonableness. But how reasonable is this amount? In the first place the $2.00 amount may be compared with actual recreational expenditure figures. (See Table I). It is obvious that $2.00 is only a fraction of the average amount actually expended by tourists and other recreationists. As was suggested earlier in the analysis, the median average of such expenditures in California was between $8.00 and $9.00. Thus, the $2.00 value attributed to that

part of recreational use of reservoir areas for which no specific charge is made is only 20 to 25 percent as large as actual average outlays.

The reasonableness of the proposed dollar value of recreation may be measured also in terms of probable continuing benefits to the recreationists which result from a vacation in the mountainous reservoir areas. To the individual who is there for one week the immediate and carryover enjoyment of the experience is probably worth as much as $14.00, over and above his actual expenditures. To the family of four who spend a week in the area the values which are not attributable to actual money spent for such items as travel and for food and lodging are probably as great as $56.00.

Use of a basic $2.00 per visitor day of recreation figure in the Upper Feather River study was recommended. In using it or in using figures derived by its use it is necessary to avoid overlooking secondary values to the state and to the community. Statewide values need to be identified separately and described at least in terms of general benefits which are over and above purely personal enjoyment of those engaging in the recreation. Included would be such statewide values as improved mental and physical health of citizens, reduced juvenile delinquency and similar values which tend to be reflected in lower costs for institutions of restraint and institutions for treatment of the state's citizens. Important to the area itself, in addition, are expenditures for goods and services which enhance the local economy and increase the tax base. These latter derived secondary benefits, while difficult to isolate, are susceptible of analysis and could be used as evidence of heightened economic activity in the area affected by the proposed reservoir developments.

Finally, with respect to measurement of secondary recreational benefits, it should be stated that with the competition of other land uses and water uses which are susceptible to economic evaluation, measurable secondary benefits should be evaluated and computed in order to compare more adequately these uses and to assess public benefits. In fact the entire field of recreation economics is a neglected one both in reservoir studies and public recreation programs generally. While it is the belief of the authors that a well planned and appropriately balanced public and private recreation facility can show repayment capacity, the public is entitled to economic analyses that will demonstrate both the benefits and the repayment ability of users. This is necessary if for no other reason than to assemble the facts upon which public policy decisions can be made.

Medical Care: A Public Utility?†

By MANUEL GOTTLIEB*

Editor's Note. This title may suggest to the reader that *Land Economics* is straying afield in presenting a discussion on medical care. But its author, in submitting his manuscript, stated: "I am proposing in this paper that medical care be regarded and treated as a public utility." Such an approach opens the door to consideration of the manuscript on its merits. Among those who reviewed it were three doctors—all men of professional stature.

RECENT discussion of medical care has centered around schemes for prepaid medical care for the lower-income groups subject to administration at the national level. I propose to call attention to two other aspects which appear to be particularly suitable for action at the state level: one, the problem of increasing the supply of medical practitioners; and two, the question of providing medical care for the middle classes who, unlike the indigent, must pay a full price for such care. Expert investigations have demonstrated that the present shortage of qualified medical men will be intensified in the coming decades unless special efforts are made to increase the supply. And there is abundant evidence that sustained illness or major ailments often drain away middle-class savings, use up retirement assets, and undermine family solvency.

These two problems of medical care might well be resolved by treating the matter as a local public utility to be handled on a state or local level. The author is aware that medical service has not yet been technically defined as a public utility by the American courts but he submits that it is a profession peculiarly characterized by public welfare aspects and might well be dealt with in terms of the public utility concept. The states constitute a level of government close to the people in their domestic affairs. The states are the true depository of constitutional power with reference to the whole problem of medical care. Experimentation can be conducted more safely on a state level. In most states there has already been brought into existence a great variety of public instrumentalities and agencies by which and through which action can be taken in this field. The medical profession is established and regulated on a state basis. The states endow and finance most medical education; the states license medical practice; the states provide hospitalization and administer medical care for the indigent. Moreover, the principal need is not large funds which the states have little ability to raise but rather a new framework of order for medical care.[1] To provide this framework, the first and primary need is to overcome our normal inertia and sloth.

The present shortage of medical practitioners will tend to increase in the coming decades. In 1909 there were 673 persons per physician; there were 748 persons per physician in 1953. Although

† An earlier version of this paper was submitted for comments to Dr. Lester Breslow of the California Public Health Service, Dr. Reuben Berman, Minneapolis, Minnesota and Dr. Robert W. Wissler, Professor in the Department of Pathology, University of Chicago. My reviewers gave generously of their time in evaluating that version of this paper; and their detailed comments helped in the preparation of a revised (and I hope improved) version. Of course they bear no responsibility for the article or for the central thesis of the paper that medical care be treated as a public utility.

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[1] On the widespread activity of state and local governments in the field of medical care, see B. J. Stern, *Medical Services by Government, Local, State and Federal* (New York: Commonwealth Fund, 1946) chapters I-V.

each physician can perform more service because of mechanical aids, better training and medical improvements, the demand for service has been stepped up by urbanization, greater longevity, and higher levels of real income. If the entire country were to be as well equipped with medical practitioners as are the New England and Central Atlantic States area, the number of medical practitioners would need to be boosted by nearly one-fourth. But within the more favored regions, if families under $5000 received medical service on the scale received by families over $5000 or by families with comprehensive prepaid medical care, the supply of medical practitioners would require another sizeable boost. Moreover, selective surveys of the health status of various groups in the American population disclose a wide variety of un-met needs for medical care. These needs were vividly indicated by the high rejection rates for candidates for compulsory military service and the step-up of hospitalization rates under prepayment schemes. Surveys of aged persons as well as youths, migratory workers and persons suffering from mental illness all show these un-met needs.[2] Despite this demand pressure the supply of medical practitioners over the last ten years has shown only small annual increases, ranging from two to three thousand per year. The systematic drive of the medical profession through the Twenties and increasingly through the Thirties to improve quality—and restrict training facilities and enrollments—has borne fruit.[3] Unless urgent measures are taken to increase the capacity and enrollment of the medical schools the supply of medical practitioners will tend to decline relative to the larger volume of effective demand that may be expected in the coming decades.[4]

The need for expanding the number of medical schools and their enrollments may have to be met in part by action of the federal government. It is more difficult for administrative subdivisions of our economy—such as states—to project growth of their resident populations and their medical needs a generation ahead. Moreover, state training programs will only partially benefit the sponsoring states. The federal government already administers medical care on a large scale for veterans, military personnel, Indians and other groups. To a degree there is a real national security interest in a more ample supply of

[2] The evidence for unmet medical needs or shortage of trained practitioners has been effectively presented in three quasi-official reports. See the President's Commission on the Health Needs of the Nation, *Building America's Health* (United States Government, Washington, D. C., 5 volumes, 1953) v. I, pp. 11-13; II, pp. 114-152; J. S. Falk, C. R. Rorem, M. D. Ring, *The Costs of Medical Care* (Chicago: University of Chicago Press, 1933). Unmet medical needs were evaluated in terms of "standards of good medical care" based upon morbidity and illness rates. Direct survey data showed that utilization of medical facilities was hampered by lack of means and varied with income (chapters 3, 4, 9, 10). The National Health Survey of 1935-6, conducted by the United States Public Health Service, impressively demonstrated that disabilities and illness were inversely functional with income and that medical care by physicians was only 43 percent of what was considered essential. United States Public Health Service, *Public Health Report* (March 15, 1940), p. 452-455. Prepayment schemes involve more intensive use of medical facilities on a fee-for-service basis. See R. E. Rothenberg, K. Pickard, J. E. Rothenberg, *Group Medicine and Health Insurance in Action* (New York: Crown Publishers 1949), p. 202 f. See also H. Cabot, *The Doctor's Bill* (Cambridge: Harvard University Press, 1935) p. 136 f. P. A. Dodd and E. F. Penrose, *Economic Aspects of Medical Services* (Washington: Graphic Arts Press, 1939), pp. 74-5. Unmet medical needs are partly the result of personal taste and are sometimes quite unrelated to financial ability and supply of practitioners. Unmet medical needs also in part grow out of real shortage of medical facilities because of inability to finance medical care within the existing financial framework and at existing price levels. See E. Ginzberg, "What Every Economist Should Know About Health and Medicine," *American Economic Review*, March 1954, p. 108 f; H. E. Klarman "Requirements for Physicians," *American Economic Review Proceedings*, May 1951, pp. 633-645 f.

[3] The evidence with regard to this systematic drive, which was of course connected with and motivated in a large part by the desire to improve quality and raise standards, is effectively presented by M. Friedman and S. Kuznets, *Income from Independent Professional Practice* (New York: National Bureau of Economic Research, 1945), pp. 8-21.

[4] This was the central conclusion of the authoritative 1953 survey, *Building America's Health*.

medical practitioners. In these terms we can well justify the recommendation of the President's Commission on the Health Needs of the Nation that 100 million dollars of federal tax resources be spent to expand medical schools and medical enrollments.[5] However, the federal government would act only through use of existing state agencies and institutions and on a co-participating basis.

Additional action on the state level would be required to meet the second problem to which this paper is addressed, that of the high cost of medical care for the middle class. Any vigorous action to meet this second problem, except on terms favorable to the medical profession, would be foolhardy unless action were taken simultaneously to enlarge the state practitioner supply. Medical care can be treated as a "public utility" only if an adequate supply of medical service is provided. This adequate supply can be achieved only by measures which would increase the number of medical personnel, which, in turn, could be accomplished by supplying more medical scholarships in exchange for the pledge to practice for a stated number of years in the state in question. There would be plenty of qualified applicants; the expense would be inconsiderable; and we would obtain a core of practitioners dedicated to service in the state. In the light of the relative ease with which any state could build up its medical practice, inaction is culpable.[6] Laissez-faire has never been a trustworthy means to meet the professional needs of a generation yet to come whose requirements cannot possibly be gauged by the young student or his guardians. It is unfair to lure young people into training for a profession which would be overstaffed; and likewise it gravely injures the public welfare not to establish professional training facilities on a scale calculated to meet adequately the future needs of society.

The second problem, that of the high cost of medical care for the middle class, is more difficult to resolve. The patient goes to a doctor when he is in distress, oftentimes in emergency need. He is generally incapable of gauging technical competence. He cannot shop around as for other commodities. Medical care cannot be priced very readily; and many doctors will not quote a price on their services, particularly where the conditions of service vary from case to case. Finally, in local communities the sick person has a limited range of choice; there are only a few doctors to whom he can turn; doctors will not knowingly permit their services to be used as a bargaining counter. In general there is a certain indelicacy in probing into the price aspects of a professional relationship. In many cases both the quality, quantity, and kind of service needed is so uncertain that no effort is made to fix the cost in advance. The medical practitioner renders his service under open billing and without any set restriction as to the charge he may levy. But even where the charge is stipulated in advance there is no limit to the charge other than what the traffic will bear or ability to pay as this has been shaped up and worked out in medical opinion. There is no secret about this. The literature on medical economics and medical practice is eloquent with testimony for the proposition that, apart from routine calls, much of the billing for medical service is predicated upon the patient's ability to pay, tempered only

[5] "The most important thing to do to a shortage," said A. W. Lewis in his important *Principles of Economic Planning* (London: Dennis Dobson Limited, Allen and Anvin Limited, 3rd edition, 1951), p. 26, "is to eliminate it."

[6] Programs to recruit—and partly to train—practitioners for rural posts in Mississippi and Kansas are moves in the direction indicated above.

by the doctor's sense of justice and the need for some consistency of treatment.[7]

This is the reason why it is dubious that the various forms of health insurance on an "indemnity" not "service" basis are of great benefit to the middle class. The doctor can merely charge more and receive an elastic supplement over and above the insurance payment.[8] For the same reason the benefit of tax deductibility which Congress has permitted for high medical expenses may be scaled down for the patient. When medical expense is deductible for purposes of computing taxable net income, the ability of the patient to pay is heightened by the tax concession and thereby his ability to sustain a higher level of medical charges. I do not say that the immediate result of group health plans and of tax deductibility on a non-service basis is to increase medical charges. But assuredly the long-run tendency is in this direction so long as doctors keep their control over pricing, discriminate freely in their charges as between clients, and set charges on the basis of ability to pay, as much as on the basis of service rendered. It is significant that the spread between earnings of medical and other professional practitioners since the Thirties has widened considerably after the mass growth of prepayment schemes on an indemnity basis for hospitals and surgical care.[9] In the early Fifties an estimated thirty-eight percent of all expenditure for surgical care and nearly fifty percent of all hospital care was paid for through insurance schemes. In 1929 and 1939 only a tiny fraction of medical expenditure was covered through insurance.[10] Partly in consequence of this development the

[7] On the "ability to pay principle" or the "sliding scale," see Cabot, *The Doctor's Bill*, 119-123; *Building America's Health*, volume I, 43 f; Falk, etc. *The Costs of Medical Care*, 437 f. The ability-to-pay principle is explicitly recognized in the "income" limits of Blue Shield coverage plans. In 1934 the American Medical Association formally proclaimed as a basic principle that "in whatever way the cost of medical service may be distributed, it should be paid for by the patient in accordance with his income status and in a manner that is mutually satisfactory." *Journal of the American Medical Association*, June 29, 1935, p. 2364.

[8] This has in fact been alleged by doctors and others close to the scene. General practitioners, we are told, tend to label Blue Shield as a "specialists monopoly" and the "surgeons and obstetricians' bonanza"! See F. Wilhams, "G. P.'s Want Fairer Share" from Blue Shield, *Medical Economics*, October 1955, Trade union leader Hayes in an address delivered before medical practitioners asserted: "In case after case, the union has negotiated higher benefits in an attempt to relieve covered employees of additional medical costs. Soon after the whole level of medical charges has risen." (*ibid.*, December 1955, p. 175) Trade union spokesmen have come to feel their medical care program was on an unsound basis when its costs were not tied down by service benefits but only by a cash indemnity. See the parade of trade union testimony in volume IV and V of *Building America's Health;* and see trade union testimony in the 1954 Wolverton Committee Hearings, United States House of Representatives, Committee on Interstate and Foreign Commerce, *Health Enquiry* (*Voluntary Health Insurance*) *Hearings* (83 Congress, first sessions, 1953-4, Pt. 6 Hayes (1696 ff.) Cruikshank (1670 ff), Biemiller (1704) Brand (1860 ff), Brindle (1886 ff), Edelman (1814 ff), Greenberg (1852 ff). Official AMA spokesmen have admitted a tendency for fees to be influenced by insurance resources but decry this as the exception. See *Journal of American Medical Association*, volume 148, 1952, 1036 f; L. S. Reed, *Blue Cross and Medical Service Plans* (Washington, D. C. Public Health Service, 1947, processed) 206. Equally noteworthy is the continuous insistence by organized medical practitioners about retaining the "indemnity" principle and retaining control over pricing except for very low-income groups where a moderate fee service schedule is conceded. See on this the accounts of Reed, *op. cit.*, 160-165, 204-217; F. Goldman, *Voluntary Medical Care Insurance in the United States* (New York: Columbia University Press, 1948) 117 f. Only 25 to 33 percent of Blue Shield subscribers are estimated to be eligible for service benefits; other subscribers are "over-income" subscribers treated on an indemnity basis. United States Senate Committee on Labor and Public Welfare, *Health Insurance Plans in the United States* (82nd Congress, first session, S. R. 359, 1951) p. 41.

[9] Surveying the moderate medico-dental earning differentials in the early Thirties, Friedman and Kuznets (*op. cit.*, 124 ff, 137 ff) found these differentials only partly attributable to a longer training period. In part the differentials were explained by supply restrictions or the "deliberate policy of limiting the total number of practitioners" (p. 124). NBER director Noyes dissented from the implication that the ability requirements of medical were substantially equal to dental practice. (See his "Dissent" pages 405-410.) They probably are not. But then dental practice is probably not as "appealing" a calling. It probably does not satisfy the service impulse to the same extent or engage the whole man. These qualities would not tend to increase medical relative to dental earnings but to depress them. A more agreeable or attractive profession for the same non-competing group earns a negative, not a positive, differential as Adam Smith argued in his well-known analysis, "Inequalities arising from the Nature of Employments Themselves," Part I of Book I, chapter X, "Of Wages and Profit in the Different Employments of Labour and Stock," *Wealth of Nations.*

[10] Wolverton Committee, *Health Enquiry*, Part 7, p. 2104; data from National Consumer Survey of Medical Costs and Voluntary Health Insurance (1953). As of 1950 the percentages would be somewhat less.

average net earnings of medical practitioners increased strikingly relative to other professional practitioners. The differentials between the two widened as follows:

TABLE I—AVERAGE NET ANNUAL EARNINGS ALL PROFESSIONAL DENTAL AND MEDICAL PRACTITIONERS, UNITED STATES: 1929, 1939-40, 1950

	1929	*1939-40*	*1950*
1. Net Average Earnings of Physicians.....	$5224	$4441	$12,756
2. Physician Earnings Expressed as a Percent of Average Net Earning of:			
a. All professional practitioners.....	137%	140%	162%
b. All dentists.....	122%	134%	172%

Source: United States Department of Commerce, *National Income*, 1951, p. 70-9, Tables 16, 27; "Incomes of Physicians, Dentists and Lawyers," *Survey of Current Business*, July 1952, p. 7.

The growing differential between medical and other professional earnings cannot be attributed entirely to improved ability to pay medical bills and systems of practitioner-controlled financial drainage. The relative increase in supply of medical practitioners has been much slower than in other professions. The relative pace of specialization has accelerated. The reported 57-hour-average working week of doctors in the postwar period probably exceeded that of other professional practitioners or the medico's working week in the Thirties.[11] Larger levels of real income and fuller employment probably induced families to increase their demand for medical care at a faster rate than for other professional services.

It is dubious, however, whether these factors alone would have brought about such postwar prosperity for medical practitioners without the special facilities for mobilizing lay income for medical practitioner use. For without these special facilities the medical practitioners would have to earn most of their income from service rendered the minority of families suffering illness and the still smaller minority struck by serious disability. In 1929, fifty-eight per cent of the families had only casual need for medical care costing $60 or less per family and generating less than eighteen percent of all charges. Approximately a third of all families experienced more serious illness and ran up charges ranging between $60-250. Forty-one percent of all charges were produced by ten percent of the families with total medical service bills exceeding $250.[12] The need for sustained medical care and the burden of serious illness has always impacted on a small minority. Financial dependence of the medical profession upon this small minority of families for the bulk of their fees gave them a narrow economic base, however intense the potential demand for medical care might be. The resulting tendency to depress aggregate medical earnings was averted only by the levy of relatively inflated charges on all financially responsible patients upon the occasion of unpostponable needs for medical care.

The system of prepaid medical care is revolutionizing the economic base of the medical profession. It produces revenue from the healthy as well as from the sick. It improves the ability-to-pay of a great many patients. It transforms most ordinary wage-earners from the medically indigent into the paying class. And it still permits the medical practitioner to extract generous fees from his middle- and upper-class clientele. Is it any wonder that medical practice in 1950 was

[11] Against a California (1934) survey showing a working week of 53.0 hours the 1949-1950 figure (nationwide) is 57.0 hours. Dodd, Penrose, *Economic Aspects of Medical Services*, 250; *Building America's Health*, III 145 f.

[12] Falk, et al., *Costs of Medical Care*, p. 115.

producing out-of-line incomes, that the disparity between medical and general professional earnings is still increasing, and that the pressure to be admitted to medical schools has increased?[13]

The financial machinery which mobilizes income for medical use is made more effective by discriminatory pricing of medical services by practitioners, i.e., a pattern of pricing which varies the price or fee according to ability to pay. Even if this power were utilized with restraint, it is an odious power. There once was a time when railroad carriers exerted a similar power over shippers. Employers once exerted it over many employees. And those who provided electricity and telephone services and local inter-urban transportation all at one time wielded this power over those who used their services. Gradually we learned how to curtail such power by bringing it under public control. I submit that it is time that the same policy was followed for the medical profession—as many doctors have urged.

To bring medical care under public control the essential step needed is to end the system whereby a doctor can levy any charges he pleases after his service is rendered and can charge different patients varying charges for the same service. The would-be patient should be able to investigate without embarrassment the terms of practice of available practitioners and to obtain a reliable basis for taking a case of over-charge to court for settlement. Finally, we need some authority capable of reducing any particular scale of charges which experience has shown to be too high. These ends could all be achieved if each doctor were required to work out a complete and detailed statement of charges for the various facilities and services he renders, including treatment of standard ailments and operations. This statement should be on a form and follow requirements worked out by a state health agency. It should be filed and registered with a state health agency and also be a matter of local record. A copy should be transmitted to each patient upon the occasion of his first contact with the doctor or conspicuously posted in the doctor's office and in hospitals. This schedule of charges should be uniform for all patients and should apply to all charges except gratis service or service performed under public control.

This would take from doctors, as from railroads, public utilities and other business now subject to the Robinson-Patman Act, the power to discriminate. It would, by disclosing price information on a standardized form, help patients to select the most reasonable service available. Patients would have a basis for protesting any given charge or for taking it to court for adjustment. It would help to police the whole arrangement if the state health agency also conducted an *ex post* examination of charges and ascertained their conformity to the basic statement filed. By achieving a full disclosure of financial commitment it would clarify the relationship between the doctor and his patient. It would help to create an informed, out of an ignorant, market. I have no doubt that many doctors, perhaps most of them, feel embarrassed by the excess of financial power which has been built into their calling; and in practice I have no doubt that they conform to the requirements which under the above arrangements would be formalized. Let it be noted, too, that it is the individual doctor who would file his own statement of charges for the range of services for which he is licensed to practice and at levels which he fixes and may change freely. There is

[13] Friedman and Kuznets, *op. cit.*, p. 124. The ratio of applicants to accepted applicants has grown from the 1.7-1.9 of the Thirties to 3.5 (1948-9), 3.1 (1950-1), 2.6 (1951-2) *Building America's Health*, III, 156.

no need for uniformity in charges and scope could be afforded local variation and individual idiosyncrasy.

A system of standard charges of this kind properly ventilated and made a matter of public record would do much also to establish a fair level of charges. For, if practitioners set too high a level for their services, they would price themselves out of their market. Since it is the poor and middle-class people who make up the bulk of our population, the charges would ultimately tend to fall to the level of those least able to pay, as the price of automobiles for all buyers is set at the low level designed to attract the indifferent buyer who needs the most persuasion. This is only an ultimate tendency and it would tend to prevail only if a liberal supply of practitioners were available. But the supply of practitioners is and will be short for years to come; and moreover, for services of many specialists and surgeons, the supply would be too limited for competition to work out to any good issue. Also, in many communities only a few doctors are available for general service and not much market-play could be expected to develop. Finally, the high prices have worked into medical tradition and fee schedules and would tend to persist. The rate-cutter would meet the disapproval of his colleagues. Hence, any system of standardized open pricing as described above would need to be supplemented in two ways.

Many of the charges might be set too high and the state public health agency would need authority to investigate such alleged high charges and, after finding that undue earnings and public hardship have resulted from such charges, reduce them to a more appropriate level.[14] This administrative decision would of course need to be subject to a court review if the individual doctor should contest the administrative judgment. Where the service is sufficiently standardized and the practice sufficiently widespread, the agency might well be given general authority to promulgate state-wide rates where case investigation and field inquiry show this to be required.

On what basis should the state agency set charges and subject to what standards can we ascertain a fair rate of earnings beyond which gain is "undue"? Here we reach a basic issue on which there would probably not be much divergence in practice. The practitioner is entitled to a comfortable livelihood which would reimburse him for the expenses of his training and his shorter work life, and which would permit him to maintain a professional status and acquire a retirement income sufficient to assure self support after retirement. How high would this level need to be in a country where the average annual personal income derived from gainful pursuits for all employed persons is about $4000 per person? For the year 1951 the level of medical earnings yielded gross returns per physician of $22,208 and an estimated net income of $13,432. There has been a constant year-by-year increase and, at the present time (1958) these figures probably run about $28,000 and $17,000. Moreover, these figures on earnings are derived from a voluntary response to mail surveys and would be exclusive of income increments not routed through tax channels.[15] Since general practitioners on the average will see 30 patients daily and full specialists 23 patients, these income figures probably are on the minimum side.[16] This level of earnings may be too high to be sup-

[14] Where undue earnings grow out of high level of charges paid by a high-income clientele, there would be no issue of "public hardship."

[15] For description and evaluation of source, see United States Department of Commerce, *National Income* (Washington, D. C., United States Department of Commerce, 1951 edition) 71 f.

[16] *Building America's Health*, III, 150.

ported from personal service of our population and more than is needed to satisfy our predicated standards. Fortunately, it may not be necessary to reduce very much the average earnings of the typical general practitioner in order to bring the level down. The high level of earnings results from exceptionally high charges and the lucrative practice of some few general practitioners and most specialists whose earnings average two-thirds above those of the general practitioners. Perhaps the whole level of surgical fees and specialists' charges would need to be drastically scaled down.[17] This may very well be the case although it need not be determined in advance but only by the proper authority under due safeguards and after full enquiry. It is needed only that a state health authority have the power to fix maximum rates on the basis of declared standards subject to due process and enquiry.

If we then presuppose that medical charges are scaled down to a reasonable relationship to other professional earnings, we will have taken care of the middle class but we may have injured the interests of less well-off families in the process. Traditionally doctors have given medical service to many of their "poorer" patients at a lower level of charges or on a gratis basis and have made up for the deficit by charging high rates to their other patients. To finance gratis service the physician needs some economic power. There is evidence indicating that in bygone years doctors have provided much gratis service. A 1934 California survey showed that of 1309 patients per average doctor, neary twenty-seven percent were treated gratis in clinics or hospitals and another fourteen percent were given free care in private practice.[18] This was doubtless a depression record. But gratis care did not disappear in more prosperous times. Perhaps the larger part of this gratis care not routed through clinics and general hospitals was carried on the books in the form of "uncollected bills" which even in 1929 ran to 18.5% of total billings. The smaller and poorer the practice of the physician, "the higher his proportionate losses" from uncollected bills.[19] Gratis service would more readily take the form of bad debts since medical service is customarily rendered not on a cash but on a book credit basis with lax regard for collections.

Gratis work merges into the category of bad-debt losses. Under conditions of full employment and high wages the need for gratis service from the able bodied diminishes. Some 21 million veterans are covered by medical service programs which provide medical care for 100,000 patients daily at an annual cost of 650 million dollars. Under the Social Security Act, particularly as amended in 1950, medical care is provided on a restricted pay basis for such basic categories of needy as dependent children,

[17] In 1949 the average net income of general practitioners was $8,835. The part-time specialist earned one-third more; and the full specialist two-thirds more. W. Weinfield, "Incomes of Physicians, 1929-1949," *Survey of Current Business*, July 1951, 21 f. The income differentials may be falling since a 1929 survey showed that partial specialists earned nearly 56% more than general practitioners ($6100 to $3900) while complete specialists earned 2½ times the net of general practitioners. Falk, et al., *The Costs of Medical Care*, p. 206. General practitioner fee schedules for office or house calls have remained moderate, or are even on the low side, and often are unaffected by ability-to-pay considerations. Thus the 1934 California survey of charges disclosed a median statewide charge of $2.44 for an office call, $3.44 for a house call and $5.16 for a night call. (*Cf.*, Dodd and Penrose, *op. cit.*, p. 245). Rates for these services in urban areas in 1952 were only 52 percent higher than the 1935-1940 average according to AMA pricing data. See F. G. Dickinson, "The Cost of Living and Medical Care Prices," *Journal of the American Medical Association*, July 1952, p. 1157 f. The distribution of earnings between general practitioners and surgeons and specialists is a controversial theme in medical economics and arouses strong feeling which has, in part, found overt expression in the much publicized practice of fee-splitting. It has, in fact, been alleged that the "sliding scale" or the levying of fees based on ability to pay is, for general practitioners, "largely a thing of the past." Falk, et al.) *The Costs of Medical Care, p. 215.*

[18] Dodd, Penrose, *op. cit.*, p. 262.

[19] Falk, et al., *Costs of Medical Care*, 209 f.

aged, blind and other totally handicapped. Most local public welfare departments recognize the need for provision of medical care for so-called general welfare cases. The total number of persons on assistance case-loads in 1950 was some six million; and there was expended on their behalf some 225 million dollars or $37 per person for medical care.[20] Standards of medical care on a welfare basis have probably been rising. To some extent this medical care is provided by salaried ("contract") doctors employed by the county. But predominantly medical care is provided under agreements reached with local medical societies or medical schools either on a restricted fee schedule or on a moderate straight per-capita charge. Available studies indicate that arrangements vary widely.[21] While compensation to physicians for service rendered the welfare population is based on restricted schedules, this compensation compares favorably with the nation-wide per capita average consumer medical outlay of $67. The official American Medical Association program stipulates "reasonable payment to physicians on a basis agreed to by the medical society."[22]

However, under a non-discriminatory pricing system doctors would still provide medical service on a credit basis to most persons requesting medical care. It would not be feasible for doctors to insist on cash payment for medical service. A residue of uncollected bills or "bad debt losses" probably would indicate the measure of gratis service dispensed. If the possibility of overcharge were ruled out, doctors might shy away more than they do now from noninstitutionalized treatment of those less able to pay. To avoid this and to compensate doctors for the risk they would run in holding themselves open to serve on a credit basis all who need and ask for medical care, the state might well undertake to share in the financing of medical "uncollected bills." If the state responsibility under this heading applied only to "bad debts" in excess of a normal allowance (say two or three percent) and then only on a percent of the uncollected bill—and was further limited by ceiling amounts for any persons and doctor—there would be little abuse of the practice. Doctors would be protected against undue drainage on their time from uncollectible accounts.

From the viewpoint of the medical profession the assurance provided against bad debt losses would tend to offset the reductions in income through uniform, pre-stated and regulated pricing practices. And of course to the extent that the supply of medical practice is enlarged the regulated price levels will come to be increasingly self-sustaining. For the larger supply of practitioners will gradually lead to tendering of services on more attractive terms in order to solicit the patronage which a professional practice (like other business callings) requires. Or to put the same in the language of technical economics: the equilibrium level of prices for medical care will have become adjusted to the real level of earnings needed to satisfy demand and to reward the efforts and waitings which a medical career involves; but there will have been stripped from this profession the windfall gains arising out of abnormal

[20] J. F. Dewhurst and Associates, *America's Needs and Resources* (New York: The Twentieth Century Fund, 1955) 317.

[21] For Kansas see B. Gardner, *State-Local Relations in Kansas, The State Department of Social Welfare* (Lawrence, Kansas: Governmental Research Center, University of Kansas, mimeographed) pp. 117-121. On American communities generally see American Medical Association Council on Medical Service, *A Report on Medical Care of the Indigent in Ten Selected Communities*, originally published in installments in the American Medical Association Journal, 1952-3 and reprinted in United States Senate, Committee on Labor Hearings, *President's Health Recommendations and Related Measures* (83rd Congress, first session, 1954), pp. 675-750. For general surveys see *Building America's Health*, II 209-215, Dewhurst, *op. cit.*, 316 ff.

[22] *Building America's Health*, II, 214. The ten communities surveyed by AMA showed that welfare medical care was on "pay" basis.

scarcity of supply and discriminating pricing practices operating in an uninformed market.

Beneficial as these changes would be they would not solve all aspects of the problem of medical care. We have left undiscussed the problem of group versus individual practice. Extended experience has demonstrated that medical care can be provided more efficiently through group practice than through solo practice. Group practice makes possible reduced overhead for equipment and office expense; it makes possible more extended use of nursing and other practitioner aids; and it facilitates medical cooperation in diagnosis and treatment. The advantages of group practice are the economics of the organized shop over the isolated craft producer. But group practice should arise by voluntary action and decisions on the part of patients and doctors alike. The state may facilitate and induce but it should not compel. Possibly the incentive to group practice may increase once doctors are deprived of their monopoly power and are required to practice at a uniform and moderate scale of charges.

Likewise, we have up to this point neglected the problem of medical care insurance. The need for medical care in most American families cannot be budgeted in advance and financially accommodated otherwise than by prepayment through some system of group insurance. The coverage of such insurance and its administrative basis involve large subjects into which we will not enter here. The reforms which we have advocated would, however, facilitate the adoption of voluntary and partial insurance schemes on a much more comprehensive basis than now exists. A principal bar to voluntary insurance for medical care is the essentially arbitrary nature of the medical charge growing out of present pricing practices. Once a firm basis in pricing has been laid, schemes for comprehensive prepaid or partially prepaid medical care would be much more feasible on a voluntary or local basis.

It has long been recognized that medical care meets vital public needs and that more than other service activities its operations are invested with public interest. Consumers of medical commodities are permitted very restricted access to life-dealing or sustaining drugs. The sick person is in effect regarded as incompetent and is placed by the law under the custody of the physician. The medical practitioner is trained principally in subsidized public schools; he practices predominantly in publically financed hospitals and clinics; he is licensed for practice through state examinations; he is virtually required to become associated with a professional organization which has taken on a wide series of public functions. In these respects the doctor in the past virtually served a public office. For he dispensed care freely when the need was compelling and he financed his activities by assessing charges like taxes based on ability to pay.

Clothed thus in public purpose, the physician has been formally unregulated under law in his levy of charges based on ability to pay. His power was limited by the competition of an abundant supply of practitioners, by the fact that most families in any year would have little need for a doctor's services, and by the drainage on his time and energy to provide medical care for the indigent through institutions or uncollected bills. Changes in economic conditions now enable this power of taxation— i.e., of outrightly adjusting fees based on ability to pay—to become a potent instrument of economic exploitation. The force of inter-practitioner competition is muted

by the slow rate of increase of physician's numbers. The new systems of prepayment for medical care where surgery or hospitalization is involved greatly enlarge the economic base of the profession since it increases the ability to pay and provides revenues from the healthy as well. Finally, the drainage involved in caring for the poor has been greatly scaled down. Unlike other professions serving vital needs the customers of the medical practitioner have weak bargaining power and often cannot even determine the fee in advance. In consequence, earnings of the medical practitioner are outpacing his professional colleagues. It is this condition of economic power which calls for regulation similar to that visited on other basic utilities.

Detroit: A Case Study in Industrial Problems of a Central City

By HAROLD BLACK*

Nature of the Problem

AT the close of World War II, Detroit, like many other central cities of older metropolitan areas found itself with a host of new economic and city planning problems. The wartime industrial expansion had exhausted the greater part of vacant land zoned for industry. Many firms which had expanded on existing sites found themselves cramped for space.

To add to the city's woes, many workers deserted public transport and in steadily increasing numbers used their automobiles to reach their places of employment. The result was pressure for off-street parking space, a pressure that could not be alleviated because of the shortage of vacant land. This steadily mounting traffic stream also interfered with industrial trucking movements which already had the disadvantages of a lack of off-street loading to face. The problem was a circular one since trucks loading and unloading on the streets blocked the free movement of traffic.

Difficulties piled on difficulties. The large-scale appearance of the one-story horizontal plant quickly made multi-story operations obsolete. Plant after plant of this latter variety was vacated and stood as a monument to changing times. Little by little new users took over some of these vacant plants and converted them to marginal loft space. Where once these plants employed thousands of workers they now employ hundreds.

A new planning concept has arisen in the last few years, the concept of industrial blight. While its impact cannot be measured in terms of illness, delinquency, and crime rates as was done for blighted housing, nevertheless it is here. This new type of blight can be measured in economic terms such as the loss of jobs and the loss of taxes; and in environmental terms such as conflicting land uses, nuisances, and excessive traffic.

Purpose of the Study

In the light of the situation Detroit found itself in, the planning commission authorized a basic study with the following purposes: (1) To determine trends in industrial development and their impact on Detroit. (2) To determine the various pressures which cause industry to move, taking into account both moves within the city and moves to areas outside of the city. (3) To spot industrial areas having problems amenable to planing solutions (i.e., parking, traffic circulation, space for expansion, etc.). (4) To determine parcel layouts and services needed in industrial areas as an aid in industrial redevelopment and conservation. (5) To help determine, in part, the market for industrially redeveloped land. (6) To provide the background information for a complete program which would ameliorate the existing industrial problems. In setting up these purposes the Commission was particularly concerned with maintaining a healthy tax base for the City of Detroit and with the creation of a favorable environment for industry. This in turn implied stabilization of industrial employment in the central city and a measure of prosperity for its business establishments.

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Methodology

The Industrial Study was based on a questionnaire circulated by mail among approximately 4,000 industrial firms within the central city of Detroit.[1] For the purpose of the study, industrial firms were defined as all those firms bearing a Standard Industrial Classification of 191-399 (manufacturing), all utilities; mining operations;[2] and storage, wholesaling and industrial outdoor storage. In this article only the manufacturing portion of the study will be discussed.

The basic list to which questionnaires were mailed was obtained from the Michigan Employment Security Commission. This list omitted firms employing less than eight. The questionnaire itself was drafted to meet the purposes as previously outlined. It was subsequently revised after discussion with the Board of Commerce, the Michigan Employment Security Commission and the Research Committee of the Detroit Metropolitan Area Regional Planning Commission. It was further revised after testing it on a group of firms belonging to the Milwaukee Junction Manufacturer's association.[3]

The final questionnaire contained attitude questions dealing with such items as location, need for expansion, parking needs, etc. It also contained questions which, when cross tabulated, made possible the computation of parking standards, land coverage, and workers per acre. Other questions gave clues as to rail versus trucking transportation needs, water and air shipping volume. It was also possible to deduce industrial mobility from the questionnaire.

The returns on the mailed questionnaire were phenomenal. Sixty-five percent of all firms circularized replied. These firms represented eighty percent of the industrial employment.

Attitude Towards Location

One of the most important indicators as to a city's economic health relevant to the industrial base is the satisfaction with which firms regard their sites. As grievances about a site accumulate, firms begin to desire another location. Whenever conditions become ripe for plant investment at another location, firms begin to make definite plans to move.

In the City of Detroit the management of 59.4 percent of the plants answering the questionnaire were satisfied with their present location. Seventeen and one-half percent were dissatisfied with their present location but would have been satisfied with another location within the City's limits. Another 23.1 percent were not only dissatisfied with their present location but also indicated a desire for another location outside of the city. An analysis of dissatisfaction with site takes on added meaning when it is broken down by industrial types. When the data was arranged in this fashion the following was found:

	Attitude Toward Site	
Type of Industry	*% Dissatisfied with Site*	*% Dissatisfied-Desiring Outside City Location*
Food	32.2	7.6
Tobacco	33.3	0
Textile	27.3	18.2
Apparel	52.9	13.9
Wood Products (excluding furniture)	30.0	30.0
Furniture	48.2	20.7
Paper Products	33.4	20.0
Printing	34.6	8.0
Chemicals	33.4	16.7

[1] After weighing cost factors it was decided to circulate the questionnaire by mail, rather than by use of interviewers. The Detroit Metropolitan Area Regional Planning Commission and the Oakland County Planning Commission circulated a similar questionnaire to the other sections of the Detroit Metropolitan Area. This article deals only with the results obtained in Detroit.

[2] There are salt mining operations within the city.

[3] Now known as the Industrial Association of Greater Detroit.

Petroleum and Coal Products	50.0	40.0
Rubber	40.0	40.0
Leather	50.0	33.3
Stone, Clay, and Glass Products	32.3	17.6
Primary Metals	40.4	20.9
Fabricated Metals	49.3	37.0
Non-electrical Machinery	41.1	28.2
Electrical Machinery	68.0	44.0
Transportation Equipment	44.4	28.9
Instruments	31.3	12.5
Miscellaneous Manufacturing	30.9	14.1
TOTAL	40.6	23.1

It is interesting to note that wood products (excluding furniture), paper products, petroleum and coal products, rubber products, leather products, fabricated metals, non-electrical machinery, electrical machinery, and transportation equipment all have a greater percentage of plants desiring an out-of-the-city location than the citywide average. Manufacturing companies desiring an out-of-the-city location employed 50,635 workers. The following table is a breakdown, by employment, of the concerns which desired to move out of the city:

Employment of Manufacturing Concerns Desiring to Move out of the City

Employment Size	*Number of Plants*
Under 10	18
10-19	44
20-29	34
30-39	26
40-49	15
50-59	17
60-99	35
100-199	31
200-599	26
600 and over	14
TOTAL	260

Fifteen plants which desired to move out of the city did not state their employment.

The following tabulation presents a finer breakdown of the 14 plants employing 600 and over which desired to move out of the city:

Manufacturing Concerns Employing 600 and Over and Desiring to Move Out of the City

Employment Size	*Number of Plants*
600-999	6
1000-1999	3
2000-2999	2
3000-3999	0
4000-4999	0
5000-5999	1
6000-6999	1
7000-7999	1
TOTAL	14

There is no doubt, therefore, that the larger plants, which dominate the tax base and employment base, are the most likely to leave unless the city puts itself into a more competitive position with outlying areas in those items which determine management's satisfaction with site.

Definite Plans to Move

The previous section dealt with manufacturing concerns which *desired* a location outside of Detroit. This section will deal with manufacturing concerns which have definite plans to move.

It was found that 18.1 percent of the manufacturing firms had definite plans to move. 6.1 percent of the plants planned to move to another location within Detroit, 10.9 percent to a location outside of Detroit, and 1.1 percent were still undecided as to their ultimate location. The reasons given for definite plans to move out of the city are presented in the table below:

Reasons for Having Definite Plans to Move Out of the City

Reasons	*Frequency of Response*
Taxes	57
More Space Needed	56
Parking	13
Labor Problems	10

(Continued on page 222)

(Continued from page 221)

Congestion	6
Restrictive Ordinances	6
Lower Operating Costs	5
Consolidate Operations	4
Better Distribution	2
Market Shift	2
Displaced by Public Improvements	2
Cleaner Air	2
Miscellaneous[4]	24
TOTAL	189 [5]

It is evident from the preceding breakdown that the two most important reasons for having definite plans to move were taxes (largely personal taxes as gathered from the comments on the questionnaire) and need for additional space.

The following table indicates the employment size of plants with definite plans to move out of the city.

Employment Size of Plants with Definite Plans to Move Out of the City

Employment Size	*Number of Plants*
Under 10	16
10-19	23
20-29	13
30-39	12
40-49	4
50-59	9
60-99	14
100-199	11
200-599	12
600 and over	3
TOTAL	117

Twelve plants with definite plans to move out of the city did not list their employment. The total employment for plants planning to move and listing their employment comes to 11,135 workers. Of the plants in the above category and employing 600 or more workers, all three employed between 600 and 1,000 workers.

[4] All reasons which were cited only once were lumped together under miscellaneous.

[5] In many instances more than one reason was given by a company. The total of the reasons, therefore, does not equal the number of firms with definite plans to move out of the city.

Factors Affecting Attitudes Toward Location

There are various factors which determine management's attitude toward a given location. Those factors of a regional scope, such as national markets or sources of raw materials, are not covered in this report. It is assumed that city planning commissions can do nothing to alleviate problems of this scope. Problems relating themselves to industrial environment within a city, however, are amenable to physical planning solutions.

In this study, these four factors were examined: (1) Character and adequacy of industrial buildings. (2) Adequacy of land facilities. (3) Adequacy of transportation facilities. (4) Mobility of industry. These four factors will be discussed, in sequence, in the sections which follow.

1. *Character and Adequacy of Industrial Buildings.* In terms of building layout, the following percentages resulted: 78.3 percent of the firms answering indicated satisfaction; 21.0 percent indicated dissatisfaction and 0.7 percent felt that this factor was unimportant.

Condition of plant, at least in the minds of industrial management, was not an important factor in determining satisfaction. Another study in the City Plan Commission's office indicates a great range in the condition of industrial plants.[6] But, regardless of this variety of plant condition, 90.9 percent of all industrialists indicated they were satisfied with the condition of their plants.[7]

Another factor which was taken into account in this study was the age of manufacturing structures. The median age was found to be 28 years. The following is an age breakdown of the plants replying to this survey:

[6] *Industrial Corridor Rating Study*, 1956.

[7] Apparently size and layout of plant were more important factors in determining plant satisfaction.

Period Built	*Percent*
Pre-World War I (before 1914)	17.4
World War I (1914-1918)	6.9
Post World War I (1919-1930)	29.7
Depression (1931-1935)	4.4
Pre-World War II (1936-1940)	10.0
World War II (1941-1945)	10.3
First Postwar Period (1946-1950)	13.8
Second Postwar Period (1951-1954)	7.5
TOTAL	100.0

It can be seen from the preceding table that almost a fifth of our industrial plants predate World War I. The greatest expansion in plant building took place in the 1920's during a period of high prosperity. This was a period of growth not only for industrial use but also for flats and apartments in the City of Detroit. This period culminated in the depression of the 1930's. Beginning with 1936, growth began to accelerate but housing and commercial development outstripped industrial development within the boundaries of the city.

Based on the study, it can be noted that the median age of the following industrial types exceed the median age for all industry within the city: food processing, textile, and apparel manufacturing; printing; chemicals; rubber; stone, clay, and glass products; primary and fabricated metals; transportation equipment. Of the above types it is interesting to note that rubber, fabricated metals, and transportation equipment have a greater than average percentage of plants desiring to move out of the city.

The number of stories in a manufacturing plant is directly tied in with efficiency of operation. The one-story, horizontal plant is in great demand for manufacturers. In the city of Detroit 71.6 of the existing manufacturing plants that replied to this survey were one-story in height: 18.0 percent of the plants were two-story: 10.4 percent were three-or-more story. In other words, 28.4 percent of the plants were multi-story.

On the other hand, 89.2 of the plants replying desired one-story buildings, 8.0 percent two story, and 2.8 percent three or more story.

The following types of plants exceeded the city average in the percent of multi-storied buildings: food products; tobacco; textiles and apparel; printing; chemicals; rubber products; electrical machinery; transportation equipment; and miscellaneous manufacturing. The study clearly shows a steady trend towards one-story plants. During the period 1951-1954, almost 98.0 percent of all plants built were of single story. The horizontal plant, as has often been stated, is the type desired by manufacturers. In general, the study indicates the greater the number of stories the more likely it will be that a plant will have definite plans to move.

2. *Adequacy of Land Facilities.* One of the most important factors determining suitability of a site is its inherent possibility for expansion whenever such expansion becomes necessary: 30.1 percent of the manufacturing firms responding to the survey indicated a need for land. The total land indicated as needed by these firms came to 548.4 acres or 1.7 acres per company in need of land.

The tabulation which follows breaks down this acreage by parcel size as indicated by the firms which replied:

Size of Needed Additional Acreage

Additional Acreage Needed	*Percent of Firms Needing Land*
Less than .5	56.5
.5- .9	14.7
1- 4.9	20.4
5- 9.9	5.1
10-14.9	1.2
15-19.9	0.6
20-24.9	0.9
25 and over	0.6
TOTAL	100.0

From the above table it can be seen that over 70.0 percent of the plants needing additional land needed less than an acre to satisfy their requirements. Two plants indicated that they needed more than 25.0 acres. One of these wanted 50.0 additional acres and the other 94.0 acres.

The following purposes were cited as reasons for the needed additional land:

Reasons for Additional Land Needed

Reasons	*Frequencey of Response*
Provide Parking Space	344
Added Floor Space	239
Provide Yard Loading	147
Provide Outdoor Storage	130
Convert to 1 Story Layout	52
Miscellaneous Other	15
TOTAL	927[8]

It is quite evident that the most frequently cited reason for needing additional space was parking.

The shortage of vacant industrial land in the city of Detroit has become further aggravated with the passage of time. The following table indicates the rate of absorption of industrially-zoned, vacant parcels of 6 acres or more in size.:

Vacant Industrial Parcels of 6.0 Acres or More in Size Within the City of Detroit

Size of Parcel In Acres	*Number of Parcels*		*Number of Acres*	
	1949	*1955*	*1949*	*1955*
6- 9.9	16	9	127.7	69.2
10-14.9	17	10	204.4	115.5
15-19.9	10	2	175.2	36.6
20 and over	13	5	503.9	158.5
TOTAL	56	26	1011.2	379.8

At the present rate of absorption, reasonably sized parcels of industrial acreage, other than can be gained through redevelopment, will become nonexistent. This process of absorption makes it more difficult to find expansion room for overcrowded plants.

A good index of plant overcrowding is the percent land coverage by buildings of the industrial parcel. The citywide median is 58.8 percent land coverage. In a study of modern plants published by the Urban Land Institute,[9] it was noted that eight out of ten covered less than 35 percent of the site. This would indicate that in relation to modern standards Detroit's industrial land is definitely overcrowded. This is further conveyed by the fact that approximately 65.0 percent of the plants in Detroit cover 50 percent or more of their sites.

While it is well known that different types of processes require different worker densities per acre, in Detroit this factor had a correlation of .88 with percent land coverage. It, therefore, becomes a good indicator of land crowding.

The Urban Land Institute Study of modern plant practice indicated that 6 out of 10 plants have fewer than 25 major shift employees per acre.[10] The median for the City of Detroit is 69.3 per acre. Almost three quarters of all the plants replying to the survey had an employee density ratio of 40 or more workers per acre. It can be readily seen, therefore, that because of shortages of land and other factors, Detroit's industry overcrowds the available manufacturing land supply.

In terms of needed land, 13.2 percent of all industries replying indicated that they needed yard storage space which was not available to them at their present locations. The following types of industries indicated a great need for new yard loading facilities: food processing, wood products (excluding furniture), furniture, printing, chemicals, leather and leather products, fabricated metal,

[8] Many concerns cited more than one reason for needing additional land.

[9] Dorothy A. Muncy, "Space for Industry," *Urban Land Institute Technical Bulletin* No. 23, July 1954, p. 11.

[10] Dorothy A. Muncy, *op. cit.*, p. 12.

electrical machinery, and miscellaneous manufacturing.

The following industries had a great need for new yard storage facilities: food processing, wood products (excluding furniture), furniture, fabricated metal, non-electrical machinery and electrical machinery.

3. *Adequacy of Transportation Facilities.* Based on replies to the questionnaire, 9 out of 10 manufacturing concerns reported that 50 percent or more of their employees came to work by automobile. This places a strain on the road network and places a premium on parking space. Due to this pattern of transportation, manufacturing concerns located within the industrial corridors have indicated a desire for a ratio of .69 parking spaces per employees on the highest shift. The present ratio is .48. Roughly, there exists a deficit of 55,000 spaces for manufacturing concerns within the corridors. Applying a standard of 320 square feet per space, the deficiency translates itself into approximately 400 acres.

The transportation of raw materials and finished products also creates a traffic problem in terms of street capacity. In modern manufacturing methods the highway is thought of as part of the conveyor belt process. Accurate timing in the delivery of raw materials and semi-finished goods is needed in order to keep the assembly lines running efficiently. Excessive delays on highways disrupt the timing of delivery and increase the costs of manufacturing.

The concept of the highway as part of the assembly line process is best borne out by the intensity of truck use for the delivery of raw materials and semi-finished goods. Eight out of ten industrialists replying to the study indicated that 50.0 or more percent of all shipments arriving within the city of Detroit from other points and destined for their plants arrived by truck. Four out of ten indicated that for them the comparable figure was 90.0 percent or more. If we added to this figure all intra-city shipments the percent of trucking use would be increased further.

The shipping of goods from plants to outside of the city locations shows an even greater tendency to use trucking. Eight out of ten industrialists indicated that 50.0 percent or more of goods in this category were shipped by truck. Six out of ten indicated that the comparable figure was 90.0 percent or more. The critical nature of highway capacity is borne out by the intensity of use of automobiles for employees transportation and trucks for the shipment of goods. There is significance, therefore, in the knowledge that almost one out of four manufacturing concerns were dissatisfied with their surrounding street pattern or traffic. Lack of railroad facilities, on the other hand, did not seem to be a major problem. Only 8.5 percent of the concerns replying stated that they had a need for railroad siding and could not obtain it. Most companies stated that they shipped a far smaller share of their product by rail than by truck.

Water transportation for other than a number of large, integrated plants receiving shipments of raw materials, plays a minor role. Only 6.4 percent of the plants replying indicated a need for this form of transportation; 3.8 percent indicated that they were presently using this form of transportation. Industrial types showing a greater than citywide need for water transportation were: food products; furniture; paper products; chemicals; petroleum and coal products; rubber products; stone, clay, and glass products; primary metals; electrical machinery; transportation equipment and instruments.

In regard to the St. Lawrence Seaway, approximately 4.0 percent of the firms felt the Seaway would affect them greatly, 16.6 percent moderately, 48.1 percent very little, and 31.3 percent not at all. Apparently, Detroit industry by and large does not feel that the Seaway as a transportation medium will have a great effect on their operations.

4. *Mobility of Industry.* It is apparent from the analysis carried on in other sections of the report that industries have problems in regard to the physical plant, overcrowding of land and the transporting of goods and workers. We have seen that significant portions of our manufacturing base either desire to move outside of the city or have definite plans to do so. The question arises as to industry's mobility.

Can large portions of it, based on investment and other commitments, actually move out of the city? The answer is that, while some are tied down by this type of consideration, many have moved out and many others are in a good position to do so. For example, in regard to the movement of industry, 97 plants which were on the mailing list to receive the questionnaire were found to have moved out of the city. The list was up to date as of March of 1953, the mailings occurred late in 1954 and early in 1955. The 97 plants had moved out within this short period. These 97 plants had employed 8,809 workers.

The Detroit Metropolitan Area Regional Planning Commission has compiled a list of plants which have moved out of the city between the years 1937-1949. This list is not complete and yet it indicates that 188 plants have moved out of the city during this period. Another list which this agency has indicates that 161 plants moved out of the city between 1950-1955. These plants employed 8,800 workers.

These facts would indicate that industry is potentially mobile and in many cases moves in response to problems. Central cities must institute programs for rehabilitating their industrial areas or be faced with declining economic activity and with a declining tax base.

The Finnish Cooperative Movement

By F. RAY MARSHALL*

FINLAND'S co-operative movement is perhaps the strongest in the free world on a per capita basis. Approximately three-fourths of its families are represented by members of co-operatives which account for about a third of all retail sales. In 1951 Finnish co-operatives accounted for more than twice the percentage of total retail sales and sales per inhabitant as Sweden, a country in which co-operatives are quite strong. At the same time 24 percent of the Finnish population belonged to co-operatives as compared with 11 percent in Denmark, 21 percent in Iceland, 8 percent in Norway and 14 percent in Sweden.[1]

Co-operatives are especially important to Finnish farmers. More than 90 percent of their processed milk is delivered to co-operative dairies which market over 80 percent of all milk supplied for sale. About half of all agricultural loans come from co-operative credit societies and co-operative slaughter houses market over three-fourths of all cattle supplied for slaughter. In 1952 farmers marketed 62 percent of their grain and 60 percent of their eggs through co-operative stores and co-operatives supplied them with 60 percent of their fodder, 65 percent of their machinery and 30 percent of their seeds. On the whole, Finnish co-operatives market about 60 percent of all agricultural produce and supply farmers with a large part of their consumption and farm needs. Table I gives statistics on size and types of co-operatives in Finland.

TABLE I— FINNISH CO-OPERATIVES: TYPES, NUMBER AND MEMBERSHIP, 1930, 1940 AND 1953

Type	1930		1940		1953	
	Number	Members	Number	Members	Number	Members
Credit	1,416	144,000	1,079	156,200	607	257,540
Dairies	697	75,000	551	73,400	369	94,725
Stores	534	467,000	487	613,200	497	1,029,640
Slaughter	8	5,400	11	13,200	12	97,908
Others	3,333	75,600	3,275	95,100	4,219	269,489
Total	5,988	767,000	5,403	951,100	5,704	1,742,302

* *Source: Statistical Yearbook of Finland* (Helsinki, Finland: Central Statistical Office, 1955).

This paper will explore some of the main factors shaping co-operatives in Finland with special emphasis on agricultural co-operation. Our main aim is to give a very brief description of the movement and explore some reasons for its strength.

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[1] George R. Nelson, ed., *Freedom and Welfare* (Helsinki, Finland: Ministry of Social Affairs, 1953).

Highlights in Finnish Co-operative History

Finland's sparse settlement, harsh climate and rugged terrain have made it imperative for men to work together in order to survive. Long before 1903 when the co-operative movement became firmly established, Finns had banded together with formal rules and elected leaders for many purposes, including

hunting, burn beating (a process of clearing land by burning), reindeer breeding, erection of salmon dams, manning boats, harvesting crops and erecting houses.

While there is probably no direct relation between these early joint undertakings and the co-operative movement, there can be little doubt that these experiences made the Finns more susceptible to the co-operative ideas which came to Finland from other countries, especially Germany, after the middle of the nineteenth century.

The first account in Finnish of the Rochdale co-operative experiences was published in 1866 and the idea made significant headway in the 1870's and 1880's. During this time several societies were founded, with the aid of managers, for workers in particular factories. The initial impetus to co-operation was greater among workers in the larger cities than in rural areas. The first farmers' co-operative trading association was not established until 1898.

The events which were to produce the Finnish co-operative movement were reaching an accelerated tempo toward the end of the century. Growing communication with Western Europe brought news of the efficacy of co-operation; in 1898 Axel Granström, Secretary of the Board of Trade and Industry, published a Finnish version of his book, *Co-operative Self-Help Societies*, which was based largely on German sources. One year later, Hannes Gebhard, usually acclaimed the "Father of Finnish Co-operation," published his book *Agricultural Co-operation in Other Lands*. At the same time, Gebhard, lecturer and later professor in Helsinki University, founded a co-operative information bureau, Pellervo, and dispatched 150 university students to rural areas to preach the gospel of co-operation.

The temper of the Finnish people during this period caused these intensive educational activities to produce ready results. Finland, then a Russian Grand Duchy, was aroused by czarist attempts to make Finland more dependent on Russia after years of relative autonomy. At the same time growing industrialization was producing problems for workers and farmers who were becoming more dependent on uncertain markets. Co-operation was ideally suited to handle both political and economic problems; it provided a means of educating Finns in democratic processes for the achievement of independence, while its economic character caused it to be approved by both the Russians and those pragmatic Finns who demanded practical results.

Gebhard's Pellervo Society concentrated its activities mainly among farmers but also encouraged urban co-operatives by issuing model rules, giving expert legal advice and technical assistance to local societies and promoting the passage of a co-operative law in 1901.

The passage of the co-operative law gave such impetus to the movement that there were 80 local societies by 1903; 31 rural, 44 worker-controlled and 5 with unknown occupational leadership.[2]

Added stimulus to the co-operative movement was given by the spread of socialism during this period; the Workers Party of Finland adopted a socialist program and changed its name to the Social Democratic Party in 1903. Socialists encourage co-operation for ideological reasons but were relatively unsuccessful in their attempt to divert funds from the co-operative societies to the Party.

The real beginning of what might be called a movement among the co-operatives came when groups of local societies formed alliances to exchange information,

[2] Esko Aaltonen, *Consumer Co-operation in Sweden*, Abbreviated edition (Helsinki, Sweden: Kulutusosuuskuntien Keskusliitto, 1954), p. 25.

spread the idea of co-operation and undertook some joint economic ventures. Annual national co-operative conferences, instigated by some of the older societies, were held after 1903. The Finnish Co-operative Wholesale Society, SOK, was organized at the second of these annual conferences in 1904, despite the opposition of the Social Democrats who feared that the wholesale society would impede progress toward Socialism. Socialists were also suspicious of the Pellervo Society which they considered too capitalistic.

Co-operatives, like other organizations, were stimulated by the emergencies accompanying the uprisings in Russia and Finland after 1905. The number of local societies increased by 250 percent between 1904 and 1908. A great majority of these organizations refused to join SOK, however, because they could purchase from it without becoming members. This changed after the outbreak of World War I because SOK became the only source of many scarce goods; 90 percent of the societies had joined SOK by 1916. At that time there were about 450 local co-operatives with some 240,000 members.

The Schism

Predominantly workers' co-operatives began to decline in relative importance after the establishment of SOK, though they were still in the majority at the time of the agrarian-labor split in 1916. Agrarians constituted just under half of the societies' members at that time, if agricultural workers and sharecroppers are counted in this category.

The many causes of conflict between these elements can only be summarized here. The actual split was precipitated by procedural questions though the basic breach was caused by incompatible political and economic philosophies. Conservative farmers became alarmed at the growing strength of radical Socialism among workers. The Social Democrats emerged as the strongest party in Finland after the general strike of 1905 caused the Czar to grant universal suffrage; they actually achieved a majority of the unicameral Parliament in 1916. There were also differences between farmers as producers and workers as consumers which were aggravated by wartime inflation of both industrial and agricultural prices.

The three prominent immediate causes of schism were the workers' opposition to SOK's joining Pellervo, their insistance that co-operative interests could best be promoted by separating educational and ideological work from wholesale activities, and, most important, the larger workers' societies wanted to change representation in SOK from one vote for each society to proportional representation. There was no basic disagreement over co-operative principles.

The worker faction, which had formed a "Progressive" association to counter the farmers' "Neutral" organization, walked out of SOK's 1916 convention after a compromise on the voting issue had failed. The "Progressives" announced their intention of forming a new union of co-operative societies but wanted to continue SOK (reorganized as a joint-stock company) as a wholesale society; these plans were unacceptable to the "neutrals." The "Progressives" then formed the Central Union of Consumers' Co-operative Societies, KK, and the Co-operative Wholesale Society, OTK.

Today both sides agree that the net result of the schism was good for Finnish co-operation as is attested by its strength. Relative internal harmony permitted both movements to concentrate on satisfying their members' needs. Competition between these movements has been responsible for the greater efficiency of

each side and the increase in the number of co-operators in the country; the democratic processes of both movements probably were more vigorous in the heat of this conflict than they are today. On the negative side, the split has caused duplication of administrations and separate production facilities. A combined co-operative movement would probably have more influence in community affairs and more financial power.

With respect to consumers' co-operation, most Finnish farmers remained members of SOK societies which are also supported by a majority of white collar workers. Workers furnish the main support for the KK movement but it also contains a fairly large number of farmers; likewise, SOK draws some strength from workers. Table II presents some statistical comparisons between the two movements for 1954. They are seen to be about equal in strength; KK has more members in fewer societies but SOK has more sales in more scattered societies, reflecting its rural composition. The composition of sales differs in that SOK sells a larger percentage of hardware and manufactured goods, reflecting its sale of supplies to farmers. KK's wholesale society, OTK, sold more agricultural products, and KK's member societies produced a larger percentage of their own sales and bought a larger percentage from their wholesale society; as will be seen below, SOK member societies buy from agricultural producers' co-operatives and from their members whereas KK's member societies are not members of other co-operative wholesale organizations. One difficulty in comparing these movements is that the co-operative union, KK, is a separate organization from OTK while SOK and its educational arm, YOL, are essentially identical. This difference reflects the ideological emphasis of the socialistic KK movement which is commonly referred to by the name of its co-operative union. The SOK movement is also ideological in a sense but its greater emphasis on economic activity is reflected by the dominance of the wholesale society as compared with the union. Another difference between the two movements is that representation in SOK is on a one vote for each society basis while KK places more emphasis on proportional representation.

TABLE II—STATISTICAL COMPARISONS OF SOK* AND KK**: 1954

	SOK	KK
Member societies	375	118
Individual members	496,254	527,041
Employees:		
Central organization	4,211	3,461
Member societies	19,587	22,307
TOTAL	23,798	25,768
Sales: (Million FM)		
Central wholesale	40,001	37,069
Percentage of sales purchased from wholesale by local societies	53.2	61.9
Type of goods sold (1950) by wholesale, percentages:		
Food and agricultural	43.8	54.6
Manufactures	28.5	22.0
Hardware	26.4	17.7
Other	1.3	5.7
Percentage of Finland's wholesale trade	15	14
Number of business units:		
Shops	4,535	3,730
Production plants	154	272
Cafes and restaurants	215	241

* Finnish Co-operative Wholesale Society.
** Central Union of Consumers' Co-operative Society.
Source: Central Offices of SOK and KK, Helsinki, Finland.

Other Agricultural Co-operation

Agriculture, which (with forestry and fishing) furnishes employment to about 44 percent of the Finnish work-force, has provided fertile soil for all kinds of co-operation. Finland is a country of independent farmers; as a result of land reforms after 1918 over 95 percent of Finnish farms are owned by the people who till them. The median size of these

farms is about 18 acres and 72 percent had less than 25 acres of cultivated land in 1950; Denmark, usually considered the typical country of small farmers, has a median size farm of about 29 acres. Co-operation is important to small farmers because it is one means whereby they adjust to sudden changes and realize some of the advantages of large-scale marketing and purchasing.

Other aspects of Finnish agriculture which have made it particularly well suited for co-operative undertakings are: the habitual need for agricultural credit; poor private trading facilities during the early years of this century; the necessity of converting from grain growing to dairying and livestock after improved transportation facilities made it possible for farmers in distant places to compete with domestic grain farmers; and the growth of Finnish nationalism. Co-operatives have been the main weapons for overcoming economic problems while a strong Agrarian Party and the well organized (65 percent of Finnish farmers) Confederation of Finnish Farmers, MTK, have represented their political interests.

The educational and propaganda center of this activity had been the Pellervo Society to which SOK and 10 other central organizations belong: Hankkija, a farm equipment wholesale organization; Valio, butter and cheese export, wholesale and retail organization; Karjakunta, wholesale and retail meat organization; Vientikunta Muna, wholesale and export egg society; Ossuskassojen Keskus, Central Bank of Co-operative Saving Funds; Ossuskunta Metsälitto, Co-operative Forestry Association; Metsäkeskus, Central Forestry Organization; Vakava, Mutual Fire Insurance Company; and Kekri, Mutual Reinsurance Company for cattle. In all, 1,600 local organizations are members of Pellervo. There are smaller parallel organizations for Swedish-speaking farmers which need not be discussed here.

Most Finnish farmers must join many marketing co-operatives because of the specialized nature of the country's retail trade. They often need belong to only one purchasing organization, however, because SOK's consumer societies supply their members with a variety of requisites.

Finnish co-operatives established the wholesale society Hankkija during the revolutionary conditions around 1905 in order to make possible the more stable, economical and certain procurement of such vital agricultural requisites as fertilizer, feed, seed, grain and agricultural equipment. Local specialized farmers' associations were first used for this purpose but they proved unsuccessful. It was found more convenient and economical to combine the sale of agricultural requisites with consumers' goods in the local societies catering to farmers. For this reason local dairies and consumers' co-operatives comprise 94 percent of Hankkija's membership while individuals, farmers' clubs and credit societies make up the remaining six percent.

Finnish farmers derive a larger percentage of their income from dairying than any other source and co-operatives are widely used in this industry. Dairying furnishes 60 percent of Finnish agricultural income and, by value of products, is the country's second largest industry. Almost three-fourths of Finland's total cultivated area is used for crops to feed cattle.

There are some 369 local dairy co-operatives in Finland with about 95,000 members. Most of these dairies belong to The Central Federation of Co-operative Dairies, Valio. About 60 percent of all milk delivered to Finnish dairies is processed into butter, 90 percent of which

is handled by Valio. Valio also produces cheese for sale at home and abroad. There are also two wholesale dairy co-operative federations for Swedish-speaking Finns.

Valio renders many important services for co-operative dairies including the rendition of technical advice and the publication of a newspaper and various scientific works. It maintains a scientific laboratory headed by Nobel Prize winner Professor A. I. Virtanen who discovered a fodder-preserving process that greatly improved Finland's livestock industry.

The sale of livestock through co-operatives is an important secondary source of income for Finnish farmers. Co-operative slaughter houses and their Meat Producers' Central Organization marketed 42 percent of Finland's meat in 1952. The Meat Producers' Central has twelve member societies with 100,000 individual members.

Since 1936, when dissatisfied meat producers' organizations withdrew, the co-operative meat wholesale society Karjakunta has been almost exclusively an organization of consumers' co-operatives. Karjakunta maintains 18 branch offices, seven meat utilization factories, 11 slaughter houses and six food kitchens; the products of these activities are sold mainly through local consumers' co-operative societies which also act as livestock collecting agencies for Karjakunta. Karjakunta and its member societies market about one-fourth of Finland's meat.

In addition to these major agricultural undertakings, Finnish farmers perform many other activities through co-operatives including: ownership of breeding stock, saw mills, flour mills, ownership of machinery, electric power facilities, co-operative telephone exchanges and societies to market specialized crops.

Co-operative Credit

In the last half of the nineteenth century, Finnish farmers faced two major problems: the shift from subsistence to market agriculture and growing international competition in agricultural products resulting from cheap transportation facilities. It became imperative for Finland's farmers to shift to such activities as dairying which offered partial immunity from distant competition. These events increased the capital requirements of Finnish farmers who were persuaded that private traders could not adequately provide.

Hannes Gebhard and Pellervo took the initiative in establishing co-operative credit societies to meet the needs of Finnish farmers. A Central Bank of Co-operative Credit Societies, OKO, was established in 1903, after which local credit co-operatives were established, modeled after those set up by Raiffeisen in Germany where Gebhard had studied. OKO's initial capital was a government loan at three percent interest. In 1903, when OKO was established, there were eight local societies with 253 members; today there are some 690 locals with about 258,000 members.

Local credit societies are governed much the same as other co-operatives in Finland except that members are jointly and severally liable for the credit societies' debts. Policy decisions are made at general meetings at which each member has one vote. Small societies usually elect boards of management directly whereas larger ones elect boards of administration which in turn elect the management boards. The board of management elects a managing director of each society who must be approved by OKO.

The central bank, OKO, is owned entirely by the co-operative credit societies and the government which holds only 2.5

percent of its shares though it also grants credit to other co-operative undertakings in agriculture.

The ownership of OKO is also reflected in its Board of Administration which consists of 15 members, three of whom are appointed by the Ministers of Agriculture and Finance and the Council of the Bank of Finland. The other 12 members are elected by the general meeting of members. The actual management of the central co-operative bank is conducted by a Board of Directors elected by the Board of Administration.

OKO obtains a large part of its working capital from government loans; in 1952, for example, 51 percent came from this source. Only 18 percent of its working capital came from reserves which each local society must make with the central bank to the extent of 10 percent of their deposits. Seven percent of OKO's working capital in 1952 came from its own funds, and the remaining 24 percent came from other loans and bonds.

The local credit societies get most of their borrowed funds from deposits which they have been permitted to take from the general public since 1917. They obtained 70.8 percent from this source in 1952 and borrowed 29 percent from OKO. Local societies derive a very small part (about 1 percent in 1952) of their working capital from their own funds, a fact which has caused them some concern in recent years. The reason for the small percentage of owned funds in the local societies is that the value of their shares has not increased with the tremendous postwar inflation.

The local credit societies are very careful in their loan policies. In the early years, when they were very small and all members were known to the managers, it was possible to make loans to members without security but, except for loans to local governments and public organizations, all loans are now secured. In 1951, 35 percent of the societies' loans were on the basis of personal guarantees, 43 percent were backed by mortgages, and 15 percent by other security.

An investigation by the Bank of Finland revealed that, in 1952, co-operative credit societies had made about 55 percent of all loans to agriculture. They granted about a fourth of the loans made by all financial institutions and, with the saving banks of the consumer co-operatives, held about 25 percent of total deposits. Co-operative dairies received 70 percent and slaughter houses 80 percent of all their loans from this source in 1951. Sixteen percent of the loans to farmers were for the construction of houses on old farms, 15 percent for the purchase of agricultural requisites, 15 percent for building new farms, eight percent for the purchase of machines, seven percent for the purchase of animals and the rest for the purchase of land, farms and other purposes.

The co-operative credit movement has worked closely with the Finnish government in carrying out the financial aspects of its farm programs. In the 1920's, co-operative credit societies handled the loans made by the government to landless farmers for the purchase of their own farms. After the Finnish-Soviet Armistice in 1944 the government started a resettlement program for the almost half million people who had lived in the territory ceded to the Soviet Union; co-operative credit societies handled about three-fourths of these colonization loans. Almost all of the loans made for the reconstruction of property destroyed by the war were made by co-operative credit societies.

The Finnish co-operative credit movement is mainly an agricultural movement and is dominated by farmers. About

two-thirds of its total membership, which was about a quarter of a million in 1952, are farmers and only about a fifth are workers. Farmers are in about the same proportion on the administrative boards and constitute about 80 percent of the chairmen of boards of directors.

The ideological and educational center of the Finnish co-operative credit movement is the Central Union of Co-operative Credit Societies, OKL, organized in 1928. The educational work in each area is performed by a district union and OKL serves to co-ordinate the activities of the unions and the local societies. OKL's organization into the following departments is indicative of the nature of its work: legal, statistical, advisory, auditing and publishing. OKL also maintains a security fund which is used to aid local societies in difficulties. OKO and OKL have interlocking boards of management.

The organizational structure of OKL, as well as the other central co-operative educational organizations, indicates the extent to which Finnish co-operatives have gone in their attempt to keep their movements democratic. The widest possible membership participation and control is encouraged by regional organizations, intermediary boards between members and their managers and intensive educational activities. On the whole, membership participation is fairly low and presents one of the main problems of Finnish co-operatives.

Summary and Conclusions

The strength and pervasiveness of co-operation in Finland often lead to the erroneous conclusion that Finns believe in a co-operative commonwealth and that there is no room in the economy for private enterprise. Nothing could be farther from the truth. The promoters of co-operation realize that this device is ideally suited to certain conditions, such as retail trade, marketing farm products and obtaining farm requisites. But they are rarely used in non-agricultural production and the export industries; co-operatives account for only about five percent of total manufacturing output in Finland. Such co-operative production as does take place is not industrial workers' co-operative production in the English and French sense, but an extension of the activities of co-operative wholesale societies.

Co-operative production, though small, is important, however, because it,—and the threat of its extension—serves as an important countervailing force against the abuses of private economic power. Co-operatives serve to strengthen the checks and balances in economic life by competing with each other as well as with private traders. In Finland, as in most of the other Northern countries, co-operatives have departed from the Rochdale principles in order to engage in what they call an "active price policy" of price competition. They argue that lower prices are as important an advantage to members as dividends.

Private traders in Finland, as in other countries, have argued that this competition is unfair because the co-operatives have had an unjust tax advantage. The main issue, which was more hotly contested before the Second World War than now, was whether co-operatives should pay income taxes on that part of their surplus which came from trade with their members; co-operators usually admit the justification of taxing that part which comes from trade with non-members. Private traders have argued that co-operatives are business enterprises like any other and that there is little difference between dividends to co-operative traders and dividends to shareholders. Co-operators, on the other hand, have argued that surplus from trade with their

members is not income because it is the amount that their members have saved from previous income by using the co-operative device. The privilege of allowing co-operatives to deduct half of their surplus for tax purposes was discontinued in 1943 but refunds to members may still be deducted. Co-operatives argue that they now have no special tax privileges since private traders are allowed to deduct rebates to their customers.

Finnish co-operators also believe that their organizations give them an educational advantage which they would not have under a system of exclusive private trade. Finnish co-operatives maintain educational facilities for members and employees which not only enable the latter to be more efficient in their duties but indoctrinate both employees and members in co-operation and promote consumer education. These functions are accomplished by many techniques, including schools, periodicals, pamphlets and books, lectures, correspondence courses, study circles and films.

Besides these general advantages, Finnish farmer co-operators believe that their societies make it possible for them to receive a greater proportion of the value of their products, procure agricultural supplies, equipment and credit with greater economy and certainty and provide for uniformity as to quality of purchase and sales.

It is impossible, of course, to prove whether or not co-operatives have done all these things more efficiently than private traders could have; the main point that we are making here is that there is widespread belief that co-operatives have accomplished these functions. The truth probably is that co-operatives and private traders have spurred each other to greater efficiency and, as pointed out above, co-operation has been more adaptable to some conditions in the Finnish economy than others.

In conclusion, the following conditions have produced in Finland one of the world's strongest co-operative movements: the unsatisfactory nature of retail trade during the last part of the nineteenth and early part of this century; high interest rates and a shortage of capital; the need for organization during the many political and economic emergencies which Finns have faced; the promotion of co-operatives as a device for becoming politically and economically independent; the spread of Socialism; the fact that most farms are small and are owned by their tillers; Finland is a poor country where consumers must make the most economical use of their income; and co-operatives have become such an important part of life for practically every part of Finnish society that there seems to be very little organized opposition to them. It would, of course, be impossible to single out any of these factors as the most important; they combine to make co-operation a basic institution in Finnish life.

Commercial Development of Highways in Urbanized Regions: A Case Study†

By ANDREAS GROTEWOLD* *and* LOIS GROTEWOLD**

DURING the past ten years the number of automobiles and the volume of traffic on the nation's highways have increased by leaps and bounds. Simultaneously many new commercial establishments have been constructed along highways. In heavily urbanized sections of the country cities appear to be linked by a more or less continuous ribbon of stores, taverns, gasoline stations, motels, and other forms of highway business.[1]

Some commercial establishments cater primarily to inter-urban travelers. Others serve nearby communities but are located along highways to avoid restrictive zoning, high taxes, congestion, difficulties of access, and lack of parking space within cities. Thus, highway traffic includes both high-speed, inter-urban traffic and local traffic using the highway as an access to particular commercial establishments. Vehicles seeking the services of highway establishments must reduce speed, may need to cross the highway, and are a hazard to other travelers. In fact, traffic hindrances caused by an excessive number and variety of commercial establishments have become the major reason for the inadequacy of many inter-urban highways.

The present paper deals with U. S. highway 41 between Chicago and Milwaukee. This stretch is typical of the situation just described. The objectives of the study are to present information on the service functions, distribution, and trade areas of commercial establishments, and to explain the process by which a former through-way has been transformed into a local shopping and amusement district. Such information and the conclusions derived from it have some application to the general problem of regulating traffic flow and land uses along highways and in cities.[2]

Unless indicated otherwise the information cited in the following pages was collected by field investigation during the summer of 1956. Data pertaining to the location, service functions, age, and appearance of commercial establishments were obtained through inspection and mapping. Data relating to their trade areas, the sources of their income, and to zoning regulations were obtained through interviews. The volume of business was estimated on the basis of observations. The writers had no hope that owners or operators of highly competitive commercial establishments would release reasonably accurate information on the volume of their business

† Professor Harold M. Mayer suggested the topic of this study and invited the authors to join a field party of the Department of Geography, University of Chicago, while doing field work upon which this article is based. The expenses of a visit to the study area in May 1958 were met by a grant from the Research Council of the University of Missouri.

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[1] Three very good summary discussions of different aspects of suburbanization are those by George S. Wehrwein, "The Rural-Urban Fringe," *Economic Geography*, July 1942, pp. 217-228; Lewis Mumford, "The Natural History of Urbanization," *Man's Role in Changing the Face of the Earth*, ed. by William L. Thomas, Jr., Carl O. Sauer, Marston Bates, and Lewis Mumford (Chicago: The University of Chicago Press, 1956), pp. 382-398; Chauncy D. Harris, "The Pressure of Residential-Industrial Land Use," *ibid.*, pp. 881-895. The last two papers have extensive bibliographies. The movement of service industries into suburban areas since the late 1930's has been assessed statistically by Raymond P. Cuzzort, *Suburbanization of Service Industries within Standard Metropolitan Areas* (Scripps Foundation for Research in Population Problems, Miami University, and Population Research and Training Center, University of Chicago; Studies in Population Distribution No. 10, 1957).

[2] For a study of commercial highway development in an essentially non-urban setting see Elizabeth Eiselen, "The Tourist Industry of a Modern Highway: U. S. 16 in South Dakota," *Economic Geography*, July 1945, pp. 221-230.

and therefore this question was omitted from all interviews.

The Study Area

Route U. S. 41 between Chicago and Milwaukee was constructed as a four-lane highway during the early and middle 1930's. It passes over level or gently undulating land several miles to the west of Lake Michigan (Fig. 1). It is the most heavily traveled road between the two cities. The section of the highway immediately north of the city of Chicago has been superseded recently by Edens Expressway. This limited-access highway, without commercial development, avoids the traffic congestion of Chicago's northern suburbs.

The stretch of U. S. 41 selected for this study is 60 miles long. Its southern limit was the northern terminus of Edens Expressway; its northernmost point was a gasoline station in Milwaukee at the northeastern corner of the intersection between U. S. 41 and Morgan Avenue (the most northerly intersection shown on Fig. 1). At no place within this stretch did an urban block pattern have access to U. S. 41. All commercial establishments located here were commonly approached by automobile.

The most conspicuous structures within the study area were commercial establishments catering to highway customers but they occupied only about one-tenth of the total highway frontage. Approximately two-thirds of the land along the highway was used for farming. Other land uses included railroad tracks, small-scale manufacturing, the storage of construction materials and equipment, residences, and sites for billboards.

Service Functions

During the summer of 1956 there were 317 commercial establishments within the segment of U. S. 41 included in the study area. The great majority of these, 266 to be exact, were exclusively service establishments and derived all their income from serving customers approaching from the highway. The remaining 51 establishments included farms, nurseries, a few residences, and one lumber company. They conducted some business with highway travelers also, but the larger part of their income was derived from other activities. These two broad groups of establishments will be discussed separately.

Establishments Deriving All Income from Highway Customers. These 266 establishments provided a great variety of services, including the sale of gasoline, auto repairs, restaurant service, drive-in snack bars, tavern service, the rental of motels or cabins, the sale of antiques or gifts, the sale of specialized food products, outdoor recreational services, auto auctions and sales, the sale of groceries, and a great variety of other services. Such "other services" included the sale of furniture, feed, paint, hardware, farm implements, boats and boat motors, trailers, tombstones, ready-made log cabins, sporting goods, liquor, ready-made concrete steps, concrete garden decorations, awnings and garage doors, and the services of animal hospitals, a general mechanic, a "swap shop," and a dry cleaner.

Many establishments offered more than one type of service. For example, at most gasoline stations it was possible to get a minor repair job done and to buy a soft drink and a candy bar. Such additional services were disregarded in this survey unless they required a special attendant or extra installations such as a sales room, a special counter, a gasoline pump, or extra highway frontage. By this definition a gasoline station which provided a lunch counter with a waitress, another large counter for the display of

gifts, and a mechanic who worked in a fairly well-equipped garage was classified as a multiple-service establishment. If gasoline sales accounted for a larger share of the total income than any of the other services, the gasoline service was regarded as the dominant function and the other services as minor functions.

Of the 266 establishments deriving all their income from highway customers, 173 were single-service establishments and 93 multiple-service establishments.

TABLE I—Services of Establishments Deriving All Income from Highway Customers

Types of Service	Only Function of Single-Service Establishment	Dominant Function of Multiple-Service Establishment	Minor Function of Multiple-Service Establishment	Total Number of Times That Service was Provided
Sale of Gasoline	41	21	22	84
Auto Repairs	6	9	7	22
Restaurant Service	19	20	40	79
Drive-In Snack Bar Service	6	—	6	12
Tavern Service	15	25	27	67
Rental of Motels or Cabins	39	8	5	52
Sale of Antiques or Gifts	3	1	9	13
Sale of Specialized Food Products	2	8	11	21
Outdoor Recreational Services	6	1	1	8
Auto Auctions and Sales	6	—	2	8
Sale of Groceries	5	—	1	6
Other Services	25	—	—	25
Total	173	93	131	397

Table I shows the various services which they provided. The totals which appear at the bottom of the table list the 173 services of single-service establishments, the 93 services which were dominant functions of multiple-service establishments, 131 services which were minor functions, and the total number of 397 services. The right-hand column shows the total number of times that each service was provided. Gasoline service was offered most frequently, followed by restaurant service, tavern service, and the rental of motels or cabins. Of the 84 places selling gasoline, almost half were single-service establishments. In the

motel and recreational businesses the proportion of single-service establishments was even greater. Notably, the places providing "other services" were all single-service establishments. On the other hand, auto repair shops, restaurants, taverns, antique or gift shops, and specialized food shops were most commonly associated with other types of business.

Establishments Deriving Only Supplementary Income from Highway Customers. The 51 establishments to which the highway business was of secondary importance included 37 farms selling food products, three farms selling dogs, three residences offering tourist accommodations, six nurseries, one lumber company selling garden furniture, and one farm offering both tourist lodging and food products. The operators of such establishments usually needed little space to serve their customers, and their expenses for advertisement, equipment, and employees were small. Most of them served customers only during the vacation season or on week-ends when traffic was heavy, or when their supply of the commodity they provided was plentiful.

Distribution

Commercial establishments along U. S. 41 were very unevenly distributed (See Fig. 1). In the southern section of the study area there was a stretch of five miles without any commercial development; in contrast, more than ten establisments were located within one-mile stretches along other parts of the highway. Such uneven distribution might be related to the volume of traffic, the proximity of population centers, or to zoning regulations.

Volume of Traffic. In 1956 the traffic flow reached its maximum of nearly 30,000 vehicles per day at the entrance to Edens Expressway, the southern limit of the study area;[3] near Milwaukee it was about two-thirds as great; in the central portion of the study area it was only 12,000 vehicles per day. The number of commercial establishments showed a general increase from south to north. (Fig. 1). The southern third of the study area had the greatest traffic, but only one-seventh of the commercial establishments. Nearly twice as many were in the central section and more than half of all commercial establishments were located in the northern third. Thus, no apparent relationship existed between the volume of traffic on U. S. 41 and the number of commercial establishments.

Proximity to Population Centers. Near the 60-mile segment of U. S. 41 included in this study there were several cities which in 1956 had a population of 10,000 persons or more.[4] Over half of the total highway mileage was either in city limits or within seven miles of city limits. On such stretches the average number of establishments per mile was nearly twice as great as elsewhere.

Zoning. Some parts of the study area were within the city limits of Highland

[3] Illinois Division of Highways, and U. S. Bureau of Public Roads, *Traffic Map of Lake County, Illinois, 1953;* State Highway Commission of Wisconsin, and United States Bureau of Public Roads, *Kenosha County: Annual 24-Hour Average Traffic, 1955; Idem, Racine County: Annual 24-Hour Average Traffic, 1955; Idem, 1954 Traffic Map, Milwaukee County, Wisconsin.* Mr. V. F. Demshar of the Wisconsin State Highway Department, and Mr. M. E. Amstutz, Superintendent of Highways in Lake County, Illinois, estimated that traffic on U. S. 41 had increased about 5 percent a year, and probably somewhat more at the northern and southern ends of the study area. The traffic flow in 1956 was derived by adding 5 percent to the traffic flow for each year that had passed since the surveys were taken.

[4] Recent population estimates are not available for several of the cities shown. The cities of Zion, North Chicago, Lake Forest, and Glencoe, all in Illinois, were included because their population was close to 10,000 in 1950. Data from United States Bureau of the Census, *Census of Population: 1950,* Vol. II, Parts 13 and 49 (Washington: Government Printing Office, 1952). According to an official estimate the population of one of these cities, North Chicago, had more than doubled between 1950 and 1956. See Illinois Department of Public Health, Bureau of Statistics, *Health Statistics Bulletin,* Special Release No. 37 (Springfield, Illinois: December 1957).

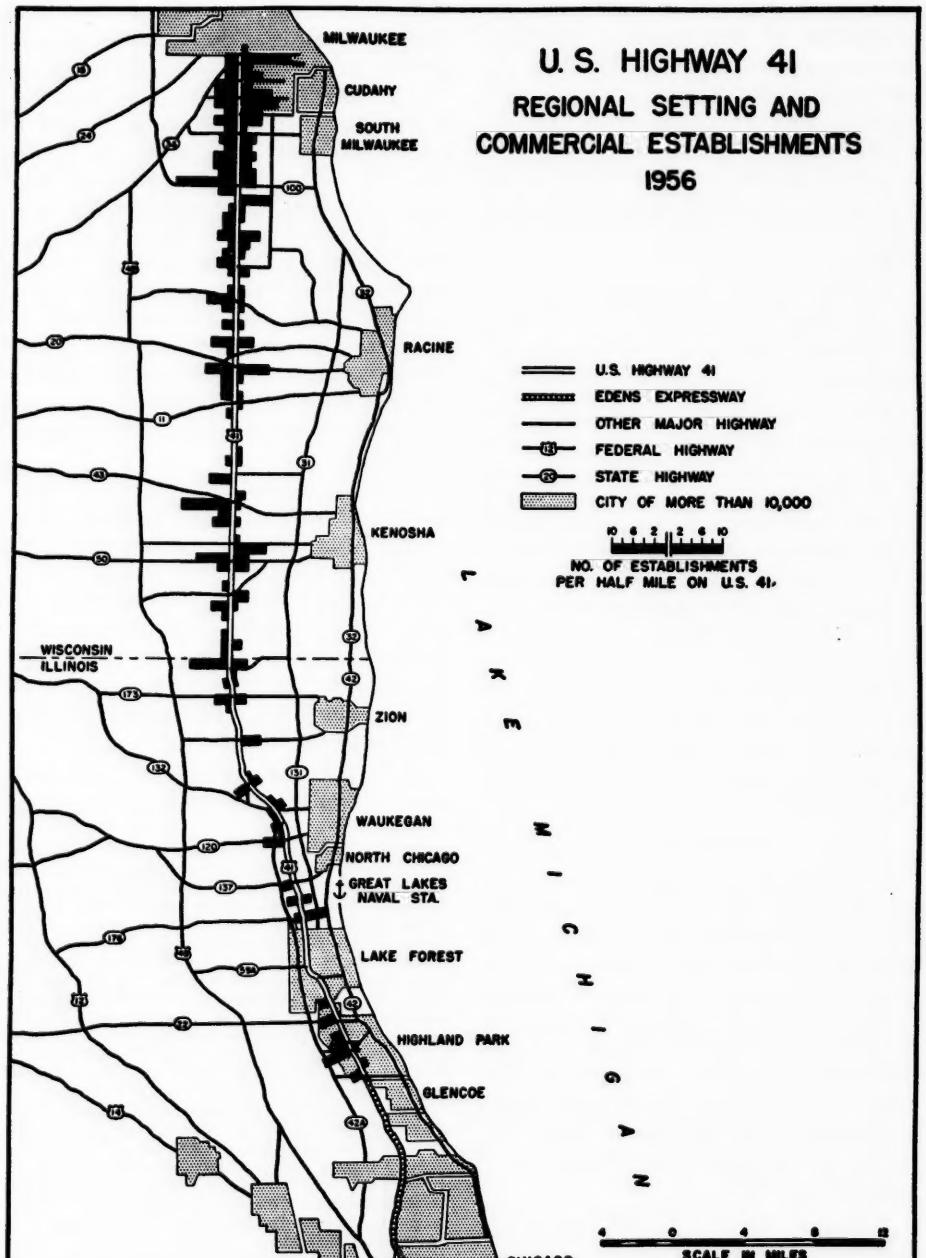
U. S. HIGHWAY 41
REGIONAL SETTING AND
COMMERCIAL ESTABLISHMENTS
1956
MILWAUKEE
CUDAHY
SOUTH MILWAUKEE
RACINE
KENOSHA
WISCONSIN
ILLINOIS
ZION
WAUKEGAN
NORTH CHICAGO
GREAT LAKES NAVAL STA.
LAKE FOREST
HIGHLAND PARK
GLENCOE
CHICAGO
LAKE MICHIGAN
U.S. HIGHWAY 41
EDENS EXPRESSWAY
OTHER MAJOR HIGHWAY
FEDERAL HIGHWAY
STATE HIGHWAY
CITY OF MORE THAN 10,000
10 6 4 2 2 4 6 10
NO. OF ESTABLISHMENTS
PER HALF MILE ON U.S. 41
4 0 4 8 12
SCALE IN MILES
A&L6

FIGURE 1.

Park, Lake Forest, and Milwaukee. The Milwaukee area, including three and a half miles on the east side of the highway, had been incorporated as recently as 1954. Nearly all the commercial establishments within this area had been constructed before that date. In 1956 both sides of the highway were lined with numerous commercial establishments. They had been attracted by easy access to and from Milwaukee, the availability of relatively cheap land, and the absence of building codes and zoning regulations. There were eleven taverns and fourteen gasoline and repair stations within these three and a half miles. Some grocery and hardware stores had located here because zoning regulations did not permit them in nearby residential developments. The general impression of this stretch of highway was one of clutter and untidiness although some individual establishments looked quite neat.

There was a great contrast in appearance between the northern and southern portions of the study area. In Highland Park and Lake Forest, at the southern end, zoning had been enacted while nearly all of the highway frontage was still vacant. Large stretches of land fronting the highway have been reserved for future residential development. This land was still vacant in 1956. Within the limited areas zoned for commercial and industrial use there were eighteen commercial establishments. Among them were two animal hospitals which had been excluded from other commercial districts but were permitted along the highway.

Other Location Factors. Zoning regulations and proximity to population centers account for the most obvious features in the distribution of commercial establishments. But they fail to explain the more detailed patterns resulting from the selection of specific sites. Even the casual observer has noticed that service establishments are often found at intersections where a business may benefit from the traffic on two roads and where cars must reduce speed. There were many such corner-site establishments on U. S. 41. The few unoccupied corners usually belonged to farmers who had refused to sell their land although they had been offered very attractive prices.

Another frequently encountered feature is a concentration of commercial establishments at state boundaries. The boundary between Illinois and Wisconsin is a fine example. Its commercial significance is based on Wisconsin's heavy tax on butter-colored margarine and higher tax on gasoline. In 1956 there was a cluster of ten commercial establishments just south of the state line. Five places sold gasoline and an equal number sold colored margarine.

Trade Areas

Commercial establishments differed considerably with respect to their clientele.[6] The relation between an establishment and its customers was found to depend upon the services which it performed, its site, location, reputation, and appearance. The following paragraphs describe briefly the origin of customers attracted to the major groups of establishments.

Recreational establishments were very much dependent on patrons from nearby communities. For example, nineteen out of every twenty visitors to a drive-in theater south of Milwaukee came from the southern part of that city or from residential districts within a radius of seven miles. Another drive-in theater in the

[6] A study of the social interactions between travelers and operators of commercial highway establishments has been made by John M. Roberts and others, "The Small Highway Business on U. S. 30 in Nebraska," *Economic Geography*, April 1956, pp. 139-152.

southern third of the study area derived nearly all its patrons from Waukegan, the Great Lakes Naval Training Center, North Chicago, and Highland Park.

Grocery stores, auto repair shops, and taverns depended almost entirely on regular customers who lived or worked within five miles. Most of the establishments classified under "other services" catered primarily to local customers also. For some—such as animal hospitals, hardware, feed, and farm implement stores—the areas served were limited to a radius of about ten miles. For others—such as a trailer sales office, and furniture, boat, and sporting goods stores—the trade areas were somewhat larger. Several of the latter establishments had moved from cities to more spacious sites along the highway and their business had followed them.

Motels, gift and antique shops, and specialized food shops served primarily through-travelers and visitors. Some places selling cheese, sausage, and spices advertised mailing service to all parts of the country. Butter-colored margarine sales, however, were limited to nearby Wisconsin residents and through-travelers returning to more distant places in Wisconsin.

Gasoline stations, restaurants, and drive-in snack bars served all groups of highway customers. The trade areas of specific establishments, however, varied greatly. All of them derived a portion of their business from regular commuters within the area between Chicago and Milwaukee. Some were almost completely dependent on such trade. They catered primarily to residents and workers at the outskirts of nearby cities who preferred to travel several miles to the highway so as to avoid the traffic and parking problems in urban business districts.

The outward appearance of an establishment and the quality of its service frequently were indicative of the group of customers that it was likely to attract. Modern places with prompt and efficient service obtained usually a larger share of through-travelers than older establishments with poor service. Some old gasoline stations and restaurants conducted very little business of any kind.

Within the 60-mile study area there were 84 establishments selling gasoline and 79 places providing restaurant service. Competition was great. In winter, when there was less through traffic, local customers became of greater importance. Therefore the operators of gasoline stations and restaurants tried to build up local trade in order to increase business and tide them over the winter. Some restaurants, for example, provided banquets and wedding receptions for groups from nearby localities.

Process of Change

There appeared to be a regular cycle through which many establishments were moving. Most had begun as single-service establishments. In due time they had to face competition from newer, more modern, and more attractive establishments providing the same services more promptly and more conveniently to customers. Some operators of older establishments had modernized their facilities; many others, however, had added supplementary services to compensate for the loss of business. Examples included gasoline stations to which restaurants had been added and restaurants to which gift shops or taverns had been added. Thus, through additional services, they had entered competition with establishments already providing such services. As time has passed and newer establishments have been constructed, older establishments have become in-

creasingly obsolescent and their business has declined. The highway has become increasingly cluttered with poorly maintained buildings and other facilities.

During the early 1930's, when U. S. 41 between Chicago and Milwaukee was constructed as a four-lane highway, it was hoped that it would serve as a through-way between these two metropolitan cities. It superseded Illinois 42 and Wisconsin 32 (Fig. 1) and thereby avoided the congestion within commercial and residential areas which had obstructed through-travelers on the older roads. Unchecked commercial development on U. S. 41, however, has frustrated such hopes. Many establishments originally designed to provide just one service to through-travelers added supplementary services and attracted customers from nearby cities. Furthermore, establishments catering exclusively to the needs of nearby residents located along the highway. Within twenty years the through-way had been transformed into a local shopping and amusement district.

Summary and Conclusions

The following five points summarize the most outstanding characteristics of commercial development as it existed within the study area in 1956: (1) The number and variety of services offered exceeded by far the demand by through-travelers for roadside services. (2) Many commercial establishments catered almost exclusively to residents of nearby urban communities. (3) The incentives for commercial development were greatest at places reached easily from nearby cities. (4) Establishments providing services sought by through-travelers had attracted sizeable numbers of local customers. (5) Commercial development uninhibited by zoning regulations and building codes had resulted in a large number and variety of establishments and a general scenery of clutter and untidiness.

The following conditions appear to be the primary reasons for the excessive commercial development: (1) Zoning regulations and building codes had been absent along large stretches of the highway. (2) The traveler's preference for the efficient, modern, and luxurious had usually attracted him to recently designed establishments. Gasoline stations, restaurants, and over-night accommodations built twenty years ago were no longer considered satisfactory by many travelers. (3) Increased competition and an ever greater duplication of services had resulted when operators of older establishments attempted to increase their business by adding supplementary services. (4) Establishments catering primarily to residents of nearby urban communities had located along the highway because of the difficulties of access, lack of parking space, restrictive zoning, and high taxes within cities. Such establishments bore no relation to through-traffic.

In 1956 commercial over-development and heavy local traffic on U. S. 41 were accomplished facts. Plans had already been made to provide a new road for high-speed, inter-urban traffic between Chicago and Milwaukee. At the time of this writing, in May 1958, the construction is under way.

In Illinois the new through-way will begin at the northern terminus of Edens Expressway and pass several miles to the west of present U. S. 41. It will be a toll road with limited access. According to present plans it will have only one gasoline station and restaurant. In Wisconsin a new free way with frontage roads on both sides will follow the route of the present U. S. 41. The free way will have no commercial development at all; about every two miles it will have

access to the frontage roads where no provisions have been made to restrict commercial development.

Once the new toll road and free way are in operation, inter-urban travel between Chicago and Milwaukee will no longer be handicapped by motorists seeking access to commercial establishments along the roadsides. But the incentives and opportunities for uncontrolled commercial development between Chicago and Milwaukee will remain unchanged. Already more establishments are being constructed along U. S. 41 in Illinois north of the city limits of Lake Forest. In Wisconsin the frontage roads adjacent to the new free way will become cluttered with commercial establishments also. Many of them will provide services sought by through-travelers on the new free way, and in ten or twenty years there will be many more than needed. As has been the case on present U. S. 41, increased competition among such establishments will result in an ever greater duplication of services and a waste of human, material, and scenic resources. In addition, of course, there will be many establishments catering to residents of nearby cities, Surely, the ugly phenomenon of "urban sprawl" will continue until we permit and control roadside services where they are needed by travelers and until we ease our traffic congestion, lack of parking space, and restrictive zoning within cities.

Product Differentiation in the Parking Market†

By MYRON H. ROSS*

I. Introduction

IT is the purpose of this paper to use data from the Philadelphia parking market to test statistically some important propositions postulated by the theory of monopolistic competition: in particular, the impact of spatial differentiation as a cause for product differentiation.

The simplicity of the Philadelphia parking market permits solution of this problem. The market is characterized by the following attributes: (1) The product, parking space, is relatively simple—no gimmicks, gadgets or green stamps. (2) The geographical layout of the center-city area is uncomplicated with the grid pattern of streets being bisected by Market Street and Broad Street. (3) Capital inputs are practically zero. (4) Labor inputs are, for all practical purposes, unskilled and homogeneous.

These conditions will make possible the solution of the following corollary problems to the intial one stated above: (1) the problem of defining market areas; (2) the implication of the definition of market areas for urban rent theory; (3) the advantage of a corner location within a given market area.

II. Model

Consumers have, more or less, the ability to substitute one lot's product for that of another. The "more or less" of the statement is of critical importance. The consumer does not consider all parking spaces to be of equal utility. He is more apt to substitute the parking space of two lots next to each other than he is to substitute the space of two lots which are, for example, five blocks apart. *Thus the problem of substitution is directly related to the problem of location.*[1]

The assumption that the consumer's ability to substitute space of one parking lot for another varies with the proximity of the lots means, in the extreme, that if two lots are similar in all respects and are in the same location, the lots offer perfect substitutes and the pattern of demand should be identical. But the very physical impossibility of this case makes for a fundamental difficulty. In the parking industry, where brands, advertising and goodwill are of little importance, spatial differences are the basic differentiating factor. As a corollary to the substitution-location relationship, it is assumed that the consumer wants to park near his destination.

It is further assumed that there is no substitution between classes of demand. "Classes" refers to the different demand classifications such as "one-hour," "two-hour," "all-day" and so on. Thus a change in the "all-day" price of Lot X is assumed to have no effect on Lot Y's "one-hour" demand. For that matter, Lot X's "all-day" price is assumed to be independent of its own "one-hour" demand.[2]

† The writer is indebted to Dr. Almarin Phillips of the University of Virginia for his helpful criticism. Dr. Jean Bonfenbrenner Crockett of the University of Pennsylvania was helpful in suggesting a viable zoning scheme. This paper was drawn from a dissertation presented to the University of Pennsylvania.

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[1] Abba P. Lerner says: "If the same thing at a different place is not the same commodity it is only because the difference in its location prevents it from being substituted for, or used in the same way, as, the same thing here." "Concept of Monopoly and Measurement of Monopoly Power," *Review of Economic Studies*, May 1934, p. 167.

[2] This is analogous to saying that the demand for women's shoes and the demand for men's (income effect neglected) are independent. The price of women's shoes will not directly affect the demand for men's shoes. There is no more a general shoe market than there is a general parking market. There is, however, a substitution *supply* relationship. (This is also true of women's shoe supply, for example, and men's shoe supply.)

The assumption that consumers want to park near their destination suggests that the pattern of demand will not be randomly distributed throughout the center-city area because the different economic activities, such as employment, amusement and shopping activity all tend to cluster roughly into districts. It follows that parking demand in particular areas should reflect the area's specific economic activities.

The definition of market groups, therefore, reduces itself to a problem of degrees of substitutability among market groups; substitutability, in turn, reduces itself largely to locational differences. From this it can be stated *a priori* that greater demand similarity exists among lots which are proximate than among lots which are distant. Where there are sharp changes in economic activity throughout the city there should also be sharp differences in parking demand patterns.

To test the hypothesis that there are significant differences in prices and quantities demanded among lots that are distant, the center-city area was divided into twelve zones. If there were significant differences, it was unlikely that the demand differences noted could have occurred by mere chance. The hypothesis that each zone forms a distinct "market area," therefore, could tentatively be accepted for operational purposes. A "market area" was defined as an area which includes lots which have a tendency to show similar demand characterists, but which excluded those which tended to show dissimilar characteristics. A "market group" was made up of all the lots in a particular area. "Firms must be placed in the same group if they sell substitute products."[3]

[3] A. G. Papandreou and J. T. Wheeler, *Competition and Its Regulation*, (New York: Prentice-Hall, 1954), p. 31.

III. The Nature of the Data

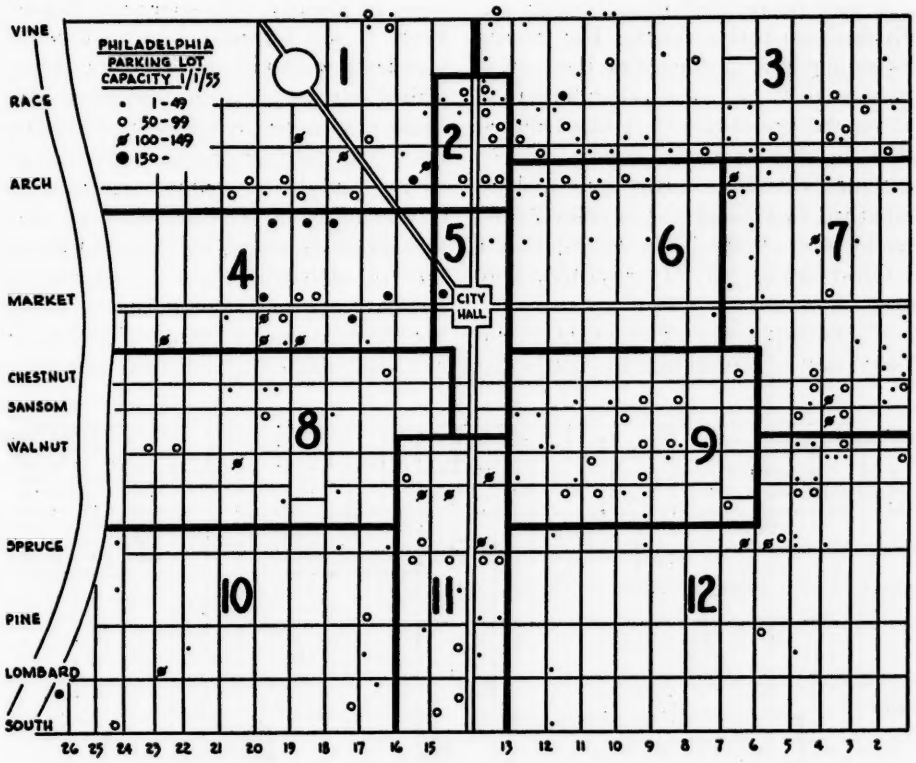
The parking lot industry in the center-city area of Philadelphia as of January 1955 was composed of 228 lots selling 12,874 parking spaces. "Center-city" refers to the areas bounded by Vine Street, South Street, and the Delaware and Schuylkill Rivers and is shown in Figure 1. (Philadelphia Parking Lot Capacity) All information concerning lots was copied from the tax records of the Philadelphia Amusement Tax Office. Parking lot gross receipts were taxed at the rate of ten percent with payments and reports by lot owners to be made on the 15th of each month.

The data for 1954 were relatively complete. During 1953 and 1954 practically all lots made returns. In 1954 gross parking revenue from the center-city area was $3,433,959. Average monthly gross parking revenue for 1954 was $286,163, about 77 percent of the entire city's gross parking revenue in 1954.

Table I shows the distribution of parking lot receipts among the twelve zones. Figure I shows the division of the center-city area into 12 zones. A full discussion of the zoning problem is

TABLE I—CENTER-CITY PHILADELPHIA TAX REVENUE FROM PARKING LOTS: 1954

Zone	Parking Lot Taxes	
	Amount	Percent of Total Center-City Parking Lot Taxes
1.	$ 29,124	8.42
2.	21,800	6.35
3.	25,836	7.52
4.	67,333	19.61
5.	19,356	5.64
6.	20,616	6.00
7.	28,767	8.38
8.	26,544	7.73
9.	40,169	11.69
10.	6,213	1.81
11.	42,749	12.45
12.	14,882	4.33
Total	$343,389	100.00



presented below. Table II shows the number and capacities of parking lots in the center-city area.

TABLE II—CENTER-CITY PHILADELPHIA NUMBER AND CAPACITIES OF PARKING LOTS: JANUARY 1955

Zones	Number of Lots	Percent of Total Lots	Number of Spaces	Percent of Total Spaces	Average Spaces Per Lot
1.....	17	7.46	1,431	11.03	84.16
2.....	16	7.02	762	5.92	47.63
3.....	43	18.86	1,881	14.61	43.74
4.....	16	7.02	2,168	16.84	135.50
5.....	2	.87	189	1.47	94.50
6.....	12	5.26	638	4.96	53.16
7.....	33	14.47	1,362	10.57	41.27
8.....	11	4.82	548	4.26	49.81
9.....	23	10.08	1,100	8.54	47.83
10.....	13	5.70	595	4.62	45.77
11.....	19	8.33	1,203	9.34	63.32
12.....	23	10.08	997	7.75	43.35
Total....	228	100.00	12,874	100.00	62.50

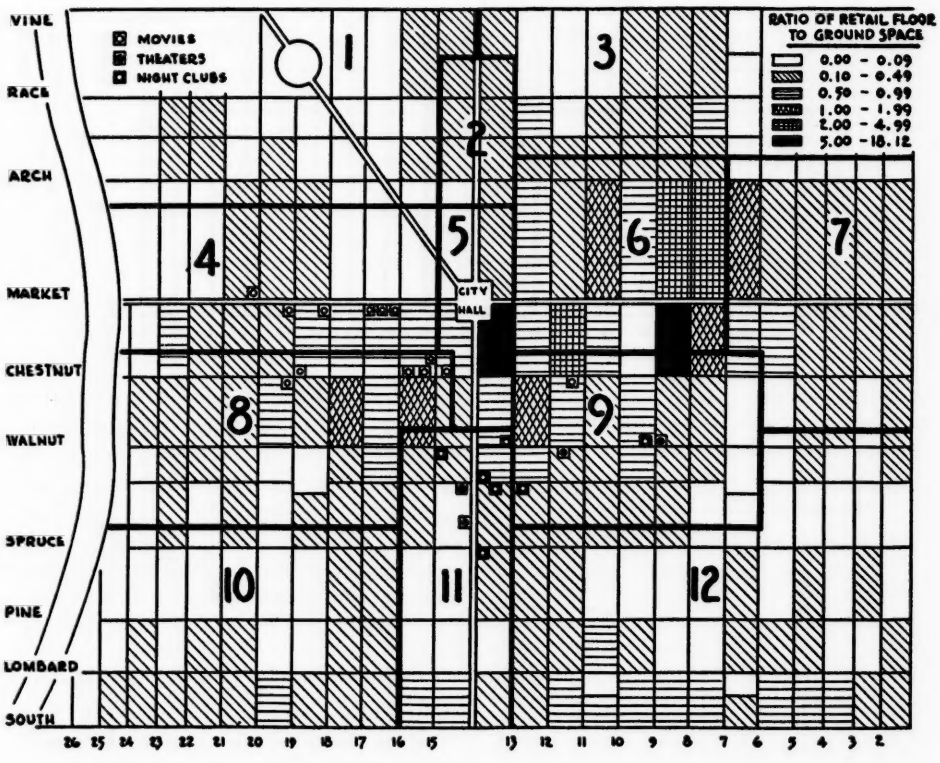
IV. The Definition of Market Areas

A. *The Null-Hypothesis.* For quantities demanded, the null-hypothesis for each class of demand was: "There are no significant differences in quantity demanded between zones." A similar null-hypothesis was tested for price differences. Following standard practice a five percent level was used in the test of significance.

B. *The Nature of Zoning.* Critical to testing the above hypothesis is the method of defining the zones. If significant demand differences and price differences result, the circumscribed lots are in a distinct market area and are part of a market group. But in order to test the hypothesis it was necessary to delineate these boundaries beforehand.

It will be recalled that the city was divided into twelve zones. The criteria for zoning were developed on the basis of past studies and general information about the center-city.[4] It was believed that in developing a zoning scheme accepted economic theory and well established facts from past studies should not be contradicted.[5] The zoning scheme is shown in Figure 1. Three criteria were used for zoning:

(1) Boundaries were intended to enclose areas dominated by particular types of activity. Paraphrasing Robert Frost, it was imperative to know what was being walled in and what was being walled out, economically speaking. Because any single area usually contained more than one type of activity, functional zoning had to be defined in terms of combinations of activities with no contiguous zones having the same combination of activity. Figure 2 (Ratio of Retail Floor to Ground Space) shows the distribution of retail floor space and the principal amusement locations.



[4] See Alderson and Sessions for the Philadelphia City Planning Commission, *Philadelphia Central District Study*, August 1951 and Philadelphia City Planning Commission. *Parking Demand in the Central City, Philadelphia*, 1951.

[5] Another approach might be along more empirical lines. Ten or twenty different zoning schemes could be developed, and the "best" one would be the scheme which showed the lowest level of significance using the F-ratio. This would demand resources which were beyond those of the writer. Furthermore, many hours were spent in studying the parking market on the spot. All lots were visited and observed in operation.

Table III shows the relative importance of employment activity.[6]

(2) Boundaries were intended to run through areas where there were sharp

TABLE III—CENTER-CITY PHILADELPHIA WAGE TAXES: 1954[1]

Zone	Amount	Percent
1.	$187,334	9.32
2.	63,224	3.14
3.	127,190	6.32
4.	54,838	2.72
5.	289,649	14.39
6.	543,242	26.99
7.	72,332	3.59
8.	177,936	8.84
9.	72,728	3.61
10.	31,642	1.57
11.	126,177	6.27
12.	266,154	13.24

[1] City of Philadelphia, Tax Office.

differences in price, quantity demanded and/or distance between lots. A sharp difference in two or three factors was fairly strong evidence that lots belonged in different zones. A precise definition of "sharp differences" was considered unnecessary because two of the three factors generally differed greatly at the same time. Thus the boundary lines tended to be drawn where the competitive links appeared weak. The selection of the parking market in center-city Philadelphia was particularly fortunate for the purpose of grouping lots because the lots tended to concentrate area-wise. If the lots were scattered randomly, this problem would be more difficult [7]

With a few exceptions, east-west boundaries were placed between main streets, while north-south boundaries were placed on main streets. If the boundaries were placed on east-west main streets, similar lots would have been placed in different zones. Such a situation, for example, exists in the 18th and Market Streets area where lots were located on opposite sides of the street. First-hand knowledge of the parking market suggests that these lots were not only similar in demand characteristics but were also in a strong competitive relationship.

On the other hand, north-south boundaries were drawn on the streets themselves because there were practically no cases of opposed lots on the north-south streets. This was probably due to the fact that most lots in the city were on the east-west streets, or corners, since these streets carry a comparatively heavy burden of traffic.[8]

(3) Boundaries were intended to be as simple as possible. Care was taken that results were not gerrymandered into existence. If boundaries were wiggled in appropriate places, the results would no doubt have been improved.

C. *Variance Analysis.* In order to measure the impact of the number of cars parked in each lot, and still maintain comparability among the lots, the following computation was made for each lot for each class of parking demand:

$$\frac{\text{Total Number of Cars Parked in Lot for Ten Months}}{(\text{Number of Spaces in Lot})\ (10)} = \text{Average Monthly Number of Cars Per Space}^{9}$$

"Average Monthly Number of Cars Per Space" (hereafter termed Q) is a ratio. Arithmetically, Q can change because of a change in either the numerator or the denominator. The cases were

[6] An example of how this criterion was implemented may be given. Zone 4 is largely devoid of shopping activity while Zone 8 has a high level of shopping activity. In spite of the fact that both areas are somewhat similar in terms of amusement activity they were separated because of the difference in shopping activity. Furthermore, Zone 8 is more significant in terms of employment activity.

[7] For the distinction between the theoretical and the statistical use of the group concept see Edward H. Chamberlin, *The Theory of Monopolistic Competition*, Fifth Edition (Cambridge: Harvard University Press, 1947), pp. 103, 202; and Robert Triffin, *Monopolistic Competition and General Equilibrium Theory* (Cambridge, Harvard University Press, 1940), p. 88.

[8] There is an exception with the eastern boundary of Zone 8. If the boundary were drawn on 15th Street, the Midtown Theatre would be separated from a string of motion picture theatres in Zone 8. This was in accord with the first criterion.

[9] Cars parked for the last ten months of 1954 were used because data were unavailable for January and February in about fifteen percent of the cases. Since January and February were close to the annual average for "number of cars parked," there was little bias due to the seasonal factor.

rare, however, where the "number of spaces in lot" changed during the period so that almost invariably the "total number of cars parked in lot for ten months" was the only factor producing changes in Q. With this computation Q was stated in terms of the relative amount of capacity being utilized and the lots and zones may be compared.

As an example, suppose Lot X had 1,500 cars parked at the one-hour price during the last ten months of 1954 and the lot had a capacity of fifty spaces, substituting in the above formula, the result is 3.00. This signifies that for the last ten months of 1954 the average monthly number of cars parked per space for one hour or less was 3.00. Following this computation Lot X's one-hour Q was combined by a simple unweighted arithmetic average with the one-hour Q's of all the other lots in the same zone. This procedure was repeated for each of the other classes of demand for all twelve zones. A similar procedure was followed with regard to price.

All lots could not be included. Some lots did not offer parking space in a given demand class. For example, most lots on the periphery of the center-city did not have a "two-hour" demand class, so that the number of lots and zones were reduced. Similarly, evening rates were found only where amusement activity or evening shopping activity is important.

Many small "monthly" lots (lots which are unattended and which offer space at a monthly price) were not included. In addition, there are many exclusions in the "all-day" and "evening" classes because many lots had the same price for both classes and as a result only reported a single quantity. Since it was impossible to determine what portion of the parking was during the day and what portion was during the evening, these lots were excluded. Finally, where the data were incomplete or possibly inaccurate, the lot was excluded.

For each class of demand, the null-hypothesis for quantities was, "There are no significant differences in Q between zones." The null-hypothesis for prices was similar. F-ratios, as developed by R. A. Fisher, were computed. The F-ratio is defined as the ratio between the greater estimate of variance of the population and the lesser estimate of the variance of the population.[10]

Table IV shows the mean Q and the mean P for each zone. Q values varied

[10] See J. J. Moroney, *Facts From Figures* (Harmondsworth. Penguin Books, 1951), pp. 370-379.

TABLE IV—MEAN PRICE AND MEAN QUANTITY DEMANDED PER SPACE PER MONTH FOR TWELVE ZONES IN CENTER-CITY PHILADELPHIA: MARCH 1954 TO DECEMBER 1954[1]

Zone	One Hour Quantity	One Hour Price	Two Hour Quantity	Two Hour Price	Three Hour Quantity	Three Hour Price	All Day Quantity	All Day Price	Evening Quantity	Evening Price
1.....	4 52	$.414	3.17	$.600	[2]	[2]	22.15	$.579	8.39	$.650
2.....	9.48	.494	7.30	.670	23.21	$.900	23.59	.833	5.07	.650
3.....	4.06	.408	4.46	.633	[2]	[2]	16.25	.657	[2]	[2]
4.....	3.58	.379	3.29	.533	3.99	.500	22.81	.689	5.38	.750
6.....	14.15	.468	9.97	.673	6.37	.900	21.70	.918	[2]	[2]
7.....	6.10	.454	5.44	.630	[2]	[2]	19.25	.722	[2]	[2]
8.....	17.50	.486	13.42	.670	7.75	.780	22.27	.912	5.81	1.000
9.....	10.57	.469	7.82	.643	5.89	.870	21.78	.835	6.14	.860
10.....	6.21	.500	6.07	.700	[2]	[2]	24.83	.700	8.98	.750
11.....	4.88	.460	6.65	.680	4.39	.890	17.01	.808	14.80	.978
12.....	12.04	.550	17.24	.600	[2]	[2]	15.75	.616	7.75	.650

[1] Zone 5 data is omitted in order to keep the data confidential. There are only two lots in this zone.
[2] These omissions are explained in above paragraphs.

from zone to zone more than the P values. It appears that few zones show consistently high or low prices for different classes of demand, perhaps with the exception of Zones 1 and 8. Thus Zone 4 has the lowest one-hour price, but is about average when it comes to evening prices. This is also true of Zone 11. This fits well into the model postulated here. Different activities exist in the different areas and it would be expected that the price combinations would vary with these different combinations of activities. For example, Zone 4 is weak in employment activity but strong in amusement activity. This would imply a low day-time price level but a relatively high evening price level.

Table V shows the results of the variance analysis. In reading Table V it should be kept in mind that the market

TABLE V—RESULTS OF ANALYSIS OF PRICE AND QUANTITY VARIANCES; MARCH 1954 TO DECEMBER 1954

	One Hour Quantity	One Hour Price	Two Hour Quantity	Two Hour Price	Three Hour Quantity	Three Hour Price	All Day Quantity	All Day Price	Evening Quantity	Evening Price
No. of Zones.....	12	12	12	12	7	7	11	11	8	9
No. of Lots.....	111	114	78	81	27	28	109	140	18	35
DEGREES OF FREEDOM										
Total.....	110	113	77	80	26	27	108	139	17	34
Between Zones.....	11	11	11	11	6	6	10	10	7	8
Within Zones.....	99	102	66	69	20	21	98	129	10	26
VARIANCE										
Between Zones.....	286.16	145.27	84.79	189.55	339.13	521.50	84.63	1532.40	38.96	748.13
Within Zones.....	17.12	29.14	9.80	33.92	3.96	16.14	17.94	161.16	8.48	71.84
F-RATIO.....	16.71	4.99	8.65	5.59	90.69	32.31	4.72	9.51	4.59	10.41
LEVEL OF SIGNIFICANCE										
5% Level.....	1.88	1.88	1.91	1.93	2.60	2.60	1.90	1.90	3.14	2.32
1% Level.....	2.43	2.43	2.48	2.51	3.87	3.87	2.51	2.47	5.21	3.29

contracted going from the one- to the three-hour class of demand. In addition there were only 11 zones considered for the all-day class because the two lots in Zone 5, opposite City Hall (Broad and Market Streets) do not have an all-day class. Demand is strong enough here so that there is no need for all-day parkers apparently.

In all ten cases the F-ratio did not exceed the one percent level of significance except the case of evening Q. In this case the five percent level of significance was not exceeded. It is highly unlikely that these differences in Q and P could have arisen only as a result of change.[11]

In general, what may be said concerning the economic significance of these statistical results? The evidence clearly points up the fact that all lots were not in competition with one another. If they

[11] The analysis of variance assumes that the within zone variances are homogeneous or homoscedastic. In applying Bartlett's test for homoscedasticity all the Q and P variances were found to be non-significant at the five-percent level. On the use of Bartlett's test see George W. Snedecor, *Statistical Methods*, Fourth edition (Ames, Iowa; Collegiate Press, 1955) pp. 250-252. It should be added that using a logarithmic transformation would have produced different results. However, since the P and Q values appear to be normally distributed this was not done.

were, their P's and Q's would not show the significant differences above.

In more positive terms, the center-city area is broken down into many different markets. The P and Q patterns indicate that lots close together were competitive or at least have similar demand patterns, whereas those separated by distance are not competitive. This indicates that the zoning technique employed was reasonable.

Since there are an infinite number of zoning schemes these results do not mean that other satisfactory dividing lines could not be drawn. The results show that the zoning scheme chosen does give a good fit for determining market areas. There seems little doubt that distance was the prime factor differentiating one lot from another.

V. Urban Rent Theory

The question of urban economic rent follows logically. Does the establishment of market areas and the corollary of locational advantages result in economic rent? A unique opportunity was offered to answer this question.

The first step was to test for significant differences in gross parking revenue among the zones, similar to the test for price and quantity differences above. A total of 157 lots, distributed among the twelve zones, were used. The F-ratio was 14.36. This value exceeds the one-percent level and this result can be considered to be highly significant.

But the enterpriser is interested in net, not gross, revenue. If costs were available it would have been possible to test for significance directly, using net revenue, rather than gross revenue data. Cost data were unavailable so the next best thing to do was to include in the above analysis only those which have a somewhat similar operating pattern and therefore a somewhat similar cost pattern. Then, assuming that costs were roughly proportionate to the number of cars parked, the conclusions for gross revenues would also hold for net revenue. In conversation with the writer, the President of the Parking Lot Attendants Union (Transport Workers Union, Local 700) indicated that this would not be an unreasonable assumption.

Since the only other important cost besides the cost of unskilled labor is land cost and, since land is relatively unimproved, these differences in gross revenue, it is felt, result in an approximation of differences in economic rent.

The fact that the enterpriser sells not only space, but space at a given location, makes this case basically different from the case of agricultural rent. The theory of monopolistic competition as developed by Chamberlin implies a basically different rent theory than the Ricardian. In agriculture, all producers have a similar demand curve, but different cost curves because each farmer is the possessor of land which is characterized by a unique bundle of net advantages.

Chamberlin, on the other hand, indicates that rent based on differences in demand (not cost) is implied by the theory of monopolistic competition.[12] Not only does the firm sell goods, it also sells convenience. In the language of this study, not only does the enterpriser sell space he sells space at a given location which the consumer prefers.

[12] Chamberlin, *op. cit.*, pp. 242-243.

VI. Differential Advantage of the Corner Location[13]

Each zone does not contain a completely homogeneous grouping of lots. As a matter of fact, there seemed to be a strong propensity to locate on the corner since roughly one-third of all center-city lots were on corners. With the intense competition for other uses for corner locations, this special appeal needs explanation. To test for this difference, the null-hypothesis was: "There is no significant difference between corner lot total revenue and non-corner lot total revenue per space." Following standard procedure, the five-percent level of significance was set. For each zone the lots were divided into two categories, "corner" and "non-corner," and a mean value of the total revenue per space was computed. The mean value of the total revenue per space was the sum of the ratios, $\frac{\text{Total Revenue}}{\text{Number of Spaces}}$ for each lot, divided by the number of lots.

Nine "t"[14] values were computed. Values for three zones contained only one lot for either category and therefore the "t"[14] values were not computed (Zones 5, 8, 10). Five "t" values were significant at the five-percent level of significance (Zones 1, 2, 6, 7, 11), one was doubtful (Zone 9), and three were non-significant (Zones 3, 4, 12).

These results indicate an important economic difference in corner and non-corner lots. This confirms the views of enterprisers who, when interviewed by the writer, felt that the following intra-zonal factors were important: (1) Ease of ingress and egress to and from the lot; (2) Whether the lot was placed on the left-hand side ("fast-side") or the right-hand side ("slow side") of a one-way street. Lots on the right-hand side, where the traffic moved at a slower pace, had an advantage. These two characteristics would generally be found with the corner lots because they face on two streets, whereas the non-corner lots face on only one street. Thus, allowance must be made for intra-zonal heterogeneity.

VII. Summary

It is felt that the statistical segmentation of the parking industry into market areas is a significant result. Increasing reality is usually secured when one takes account of locational differences. In the parking industry patterns of competition cannot be understood unless the locational pattern is fully comprehended.

The model employed here may be of value for much of retail trade. If there is anything that *cannot* be said about retail trade, it is that retail markets are characterized by pure competition or pure monopoly. These markets are characterized, like the parking market, by an admixture of the elements of pure competition and pure monopoly. And in retail trade where one locates is hardly a matter of indifference.

It has also been stressed that locational differences in parking lots result in economic rent which takes the form of a monopolistic return in contrast to agricultural rents. The location of the farm is of no significance to the ultimate consumer. In contrast, location can never

[13] This difference in rent theories can be brought out by using an "Alice in Wonderland" type of example. Suppose that a lot at 5th and Arch Streets (Zone 7) and a lot at 12th and Arch Streets (Zone 6) could deliver their spaces to the consumer. That is, a consumer who wanted to go to some location in the vicinity of 12th and Arch Streets could ask the enterpriser of the lot at 5th and Arch Streets to deliver one space. If this were possible the two lots would be in direct competition and rent would be a cost factor with the consumer being indifferent from whom he purchases space. But the "friction of space" prevents the delivery of parking spaces to consumers and creates the conditions for product differentiation, monopolistic competition, and economic rent.

[14] For the standard error formula used see Gerhard Tintner, *Mathematics and Statistics for Economists* (New York: Rinehart and Co., 1953), p. 260.

be divorced from the product in the case of parking. It is not ambiguous to speak of a "bushel of wheat" without specifying location; it is generally ambiguous to talk about "parking space" unless the location is specified. Finally, urban rent not only arises because of differences in market areas, but also because there appear to be considerable advantages accruing to the corner lot.

One important by-product relates to the demonstration this study has given to the use of tax data. It is hoped that this study will serve as encouragement for analyzing the tremendous amount of valuable raw material that lie in tax data.

Exclusive Agricultural Zoning: An Appraisal
II—Comparative Advantage†

By JACK LESSINGER*

ADVOCATES of exclusive agricultural zoning on prime lands within rural-urban expansion areas place special emphasis on a "comparative advantage" type of reasoning. They argue that, even if urban values of land were higher than agricultural values, social welfare could be maximized by a suitable pattern of area specialization provided that all the land were not needed by urbanization. A stimulating article by Howard F. Gregor supported the following criteria to determine which of two areas should be urbanized.

". . . . Preference [should] be given that area which would be the least costly from the viewpoint of the community. Significant costs would include the net agricultural values foregone, together with the costs for essential improvement. The difference between the costs of the two areas would indicate the net community advantage of developing the least costly alternative."[1]

It is noteworthy that this formula takes no explicit account of urban valuations. Perhaps urban value is assumed to be equivalent to the sum of agricultural value and the cost of "essential improvements." In any case urban value does not appear to be recognized as reflecting productivities in urban use.

Professor Gregor apparently concluded that urbanization *should* be limited to hill lands which are poor for agriculture and should be permitted to remain on the better lands below.

"The application of largely urban values in assessing land and the handicap of that philosophy to conservation of agricultural land can be vividly seen in the relationship between hill land and the valley-floor home site costs. Land valuations are higher and minimum-lot restrictions are greater in many of the hill and mountain districts surrounding the rural-urban lowlands of the San Francisco Bay and Los Angeles areas. *Thus, the type of terrain which could afford heavy urbanization with the least amount of sacrifices of agricultural land is the very area where obstacles to home building are often the greatest.* Steep slopes, while still offering construction problems, are no longer as formidable as they once were."[2] (Italics inserted).

It is evident that it was not through oversight that urban valuations were omitted from his determinations of social optima. Professor Gregor's apparent disapproval of the ". . . . application of largely urban values in assessing land . . . ." may also explain his similar evaluation of the "heavy stress on profit" in the motivation of California agriculturists.[3] Once, welfare economists equated profit maximization with all socially desirable results. We now seem faced with the assertion that profit-maximization is always a villain, that it can never lead to social optima.

The objective of this paper is to test the proposition that *prime* agricultural land should *not* be zoned exclusively for agriculture in order to maximize social product by area specialization. The argument states that urbanization cannot proceed as well on poor agricultural land as on excellent land. Greater economic benefits over costs are obtained by society if urbanization gets the best agricultural land providing such land is desirable also on the basis of urban

† Part I, which discussed agricultural shortages, appeared in the May 1958 issue of *this journal*.

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[1] Howard F. Gregor, "Urban Pressures on California Land," *Land Economics*, November 1957, p. 324.

[2] *Ibid.*

[3] *Ibid.*, p. 314.

accessibility. By no means is the present analysis on the comparative advantage issue to be taken as a final or "net" appraisal of exclusive agricultural zoning. This may only be a final step in which all economic and social impacts are evaluated.

Qualitative Analysis

In a perfect market the value of land in a given use is a measure of the contribution of the land in the creation of goods and services, assuming no external economies or diseconomies. Agricultural value of land is some function of imputed income to land from agricultural operations, plus a capital value for intangibles. Urban value depends on income from urban uses. It is true that in the real world future incomes are necessarily gauged imperfectly on the basis of past experiences: many market frictions and defects exist. Nevertheless, there is always some value which according to judgment represents "long-run" value as of a given time. It is this judgment of value which we necessarily adopt here as a measure of social product. It is no contradiction that we take certain market prices to represent long-run values. It is possible that these market prices, if anything, tend to bias the economic benefits comparison in favor of exclusive zoning and against the central argument of this paper. Agricultural prices of land may well be "high" in relation to long-run values, judging from recent decreases in net farm income and increases in land prices. Urban prices are presumed to be relatively low in rural-urban areas of scattered settlement. If urbanization were to be consolidated, land prices should be higher. (The problem of scatter is discussed briefly in an Appendix to this paper.)

When agricultural land is taken over by urban uses, its agricultural value becomes a real cost of urbanization. Thus, the net social product associated with the urban use of a given acre of land may be calculated by deducting its agricultural from its urban value.

Aggregate net social product for present purposes is the aggregate agricultural value of land occupied by urbanization deducted from its aggregate urban value. Aggregate value is value per acre times number of acres.

Aggregate net social products resulting from specialization of urbanization on each different grade of land may be compared in order to determine the alternative yielding the highest aggregate net product. Additional criteria should be applied, however, before such land is committed to specialization in urban uses.

An hypothesis on value relationships is developed here with reference to two agricultural grades of land as determined primarily by topography and by drainage. So far as these factors are concerned, our scheme corresponds roughly to United States Soil Conservation Service classifications, with "excellent" represented by Land Classes I and II and "poor" by IV or lower. However, this broad dichotomy suffices only for general rather than for specific conclusions. For decisions involving land uses in particular areas it is necessary to analyze specific land conditions. *This is especially true where only "poorer" and not "poor" lands are advocated for urban use.*

Urban developers and planners frequently talk in terms of "flat," "steep," and "hill" lands. We shall use the terms "flat" and "prime" synonymously, with the understanding that "flat" means "well-drained flat" land. "Poor," "steep," and "hill" will also be used synonymously. With rare exceptions all steep land is poor for agriculture. On the other hand, some flat land, primarily poorly drained land, is poor for both agriculture and urbanization. These are

ruled out of consideration. There are probably some cases of soils infertile for agriculture which are eminently suited for urbanization. However, inclusion of these "flat" cases as prime does no harm. That is, a higher agricultural value is imputed than is warranted, so that it would be easier to make a case for keeping this land in agriculture. Finally, there does not seem to be any important type of flat land which is good for agriculture and poor for urbanization.

Hypothesis. We now develop a set of relationships with respect to agricultural and urban values of poor and prime land. We hypothesize that these relationships tend to be the case in the rural-urban growth areas of the metropolitan United States at the present time. The following conditions hold jointly, not one at a time. 1. If residences were limited to poor soil, no more than twice as much land would be used than may have been the case if residences were limited to prime land: (a) Not more than two times more poor land than prime land tends to be used *per house.* (b) Fewer houses would be produced on poor land than on prime land since a "minimum" house can be built at a lower cost on prime land than on poor land, and the demand for houses is not absolutely inelastic. 2. The urban value of prime land with a minimum level is at least four times greater than the urban value of poor land. 3. The urban value of prime land, given a minimum level of accessibility, is at least two times greater than the agricultural value of such land. 4. If the foregoing conditions hold, the agricultural value of poor land is immaterial.

Significance of the Hypothesis. If the hypothesis is the case, urban uses *should* occupy prime land. This is indicated by the following simple algebra.

Urban value of poor land	x
Urban value of prime land	$4x$
Agricultural value of prime land	$2x$
Agricultural value of poor land	y

(Where y is any finite quantity)

$$\text{Ratio } \frac{\text{prime land used for urbanization}}{\text{poor land used for urbanization}} = \tfrac{1}{2}$$

Then:

Aggregate net social product, urbanization on poor land		Aggregate net social product, urbanization on prime land
$2\left[x - y\right]$	$<$	$4x - 2x$
$2x - 2y$	$<$	$2x$

Examination of the Hypothesis

We utilize information on hill versus flat operative building costs derived largely from only one case. This is a hill subdivision in East Oakland, a newer district of Oakland, California.[4] While no claim is made for all-encompassing generality, the data are significant because of the margins by which many of the case relationships exceed required conditions. Also, in other parts of the nation it seems reasonable to expect urban values to be as high or higher, while agricultural values should probably be lower than for the prime lands compared. Thus, we may expect our results to be applicable to at least some areas in other parts of the country.

Condition 1(a): Not More Than Two Times More Poor Land Tends to be Used Per House Than Prime Land. In the case cited, the operative builder uses an amount of land dictated largely by technical considerations. This is especially true where the objective is to provide a "minimum" hill house as closely competitive with minimum houses on the flat as possible. Under

[4] This discussion leans heavily on Mr. C. E. Peletz, Vice-President and Production Manager of Oddstad Homes, Redwood City, California. Mr. Peletz is a graduate engineer-subdivider who has supervised the building of about 5,000 homes, about half in the hills and half on the flat.

relatively steep conditions (in the case mentioned above) as a result of the peculiar topography and boundary shapes, only 2½ to 3 lots are obtained per acre compared to about 5 on the flat.[5] Taking the mid-point between 2½ and 3, or 2.75, we find that 5/2.75 is just over 1.8. Under less steep conditions this ratio may be expected to decline to 1. It is presumed that for the type of minimum house under consideration, builders would not be inclined to use more land than is required by technical considerations.

Condition 1(b): Fewer Houses Will be Produced on Poor Land Than on Prime Land Since a Minimum House Can be Built at a Lower Cost on Prime Land Than on Poor Land, and the Demand for Houses is not Absolutely Inelastic. Assuming that demand is not absolutely inelastic we confine ourselves to the matter of comparative costs of minimum houses. There are five sources of higher costs in finished hill houses: grading, erosion control planting, drainage, other lot improvements (streets, sewers, utilities, etc.), and building. Additional expenditures for "grading," "erosion control planting," and "drainage" are understandable without further explanation. "Other lot improvements" are more expensive in the hills, primarily because, as already indicated, lot yields are relatively low.

There are a wide variety of items under additional costs of building. Some of these are: (1) greater variety of plans are required to fit the various types of slopes. Architects' fees are increased. Savings from specialization of production are increased, (2) retaining walls must be built, (3) it is more difficult to bring materials to the site, (4) workmen become noticeably more tired, and (5) service problems increase due to greater exposure to weather and as a result of intricacies of side-hill construction.

An indirect cost may sometimes arise in the poorer financing opportunities available to operative builders on poor land. Land is often sold on "option" terms. That is, the land-owner receives payment as lots are sold off. Thus, in effect, he extends credit. But suppose $1,000 an acre land needs $4,000 worth of improvements to bring it up to the level of $5,000 land. These improvements must often be paid for in cash. Thus certain services of the best land, obtained on credit, must be "built-in" to the poorer land and paid for in cash or at less favorable credit terms.

The increases in cost over building on the flat may be considered in two classes. The first consists in costs which increase the price of housing but which also increase amenities of the type obtainable on the flat at about the same price. For example, a retaining wall is required in the hills but it adds extra space. The fewness of lots per acre provides an exclusiveness which would also have a value down below. The second class of costs provides advantages and disadvantages which are not comparable to those on the flat. For example, houses in the hills can have good views but also great difficulty in public or private transportation. Both classes of cost ordinarily make necessary a higher price-class house.

Between poor and prime lands there seems to be a difference in lot improvement costs of about $1600 per lot in the Oakland area cited. This assumes that 2.75 lots can be developed per acre on the poor land and five lots per acre on the prime. Thus regular lot improvements are estimated by a total cost of $8500 per acre divided by 2.75 or 5 as the case may be. Costs of grading are added in the case of "poor" only. Thus the cost of improvements for poor land

[5] *Ibid.*

is $1200 for grading plus $3100 for regular lot improvements or $4300. Costs on prime land are only $1700 for regular lot improvements.

Costs of house construction on the steep land may be from four to ten percent higher than on the flat, as a result of problems already mentioned. Thus, for a construction cost of $12,000 on the flat, there may be $480 to $1,200 additional on the hill. This is a highly speculative guess. It should be borne in mind that the two kinds of construction being compared would not provide identical amenities.

A type of hill housing could be developed at much lower costs. This would envision 35-foot lots, or about 8 lots per acre with no guaranteed "views." Three bedroom-two bath minimum houses could be built which would compare in quality with houses at the sale price built on flat 50-foot lots. Subdivisions with eight houses to an acre, however, are poor from an amenity standpoint. It seems doubtful that people will want to live "out in the country" in two-story houses with no yards and with neighbors excessively close.

As a result of extra costs, either poor raw land must be low in value relative to prime land or the price of poor land houses must be high relative to prime land houses. As a matter of fact both seem true. In the Oakland area a large difference between urban values of poor and prime lands is accompanied by higher prices of poor land houses. The steep land completed houses may be at least $2,000 more expensive than houses on the flat. It is true that steep land minimum houses are not strictly comparable to minimum flat land houses. Lots are larger, views are usually available, houses are larger and more individualistic.

In summary, it seems likely that Condition 1 substantially overstates the amount of urbanization which may be expected on poor land compared to prime. In its present form this condition represents a limit rather than an average. Therefore, if the remaining two conditions obtain, the hypothesis may be believed valid with a "margin of safety."

Condition 2: The Urban Value of Prime Land, With a Minimum Level of Accessibility, is at Least Four Times Greater Than the Urban Value of Poor Land: As a result of the different development costs discussed in *1(a)* above, steep raw land was available in the Oakland area under consideration for about $1500 per acre in 1957 which seemed comparable in location to flat raw land at about $8,000 per acre.[6] In the hinterland of Santa Clara Valley, on the basis of incomplete data, poor land seemed to be priced between $500 to $800 an acre in the early 1950's compared to $2,000 to $3,000 for prime land. Further accentuating this differential, urban values of prime land advanced at a steeper rate than did urban values for poor land.

Differential accessibility accounts for a large part of the differences observed in the Santa Clara Valley. More generally, in metropolitan areas *where agricultural zoning is an issue*, prime land may tend to have better accessibility than poor land. Sucessive areas of city growth are usually linked historically to the city's location at the time it was founded. That is, a new section of a city is on a leash, the length of which is determined by social, economic, and political linkages to existing urban establishments. Therefore, if the first urban settlements were made in the centers of large bodies of excellent soils, as may often be the case where agricultural zoning is now an issue,

[6] *Ibid.*

further growth would tend to be on these same soils.

The association between prime land and high accessibility is most likely to hold if the metropolitan area has one and only one dominant center. The net benefits of location are largely a function of distance from this center. Therefore, new additions are linked to existing urbanization by a single radius. Land with relatively high accessibility can be created only by a lengthening of the radius. This imposes drastic limitations on the supply of land with given accessibility characteristics. Therefore, high locational values become superimposed on values resulting from the physical characteristics of prime land.

Until recently theories of city growth were largely formulated in terms of the single dominant center. The significance attached to such concepts has declined coincident with new trends in metropolitan decentralization. It is apparent that urbanization often develops by means of many partially overlapping expansions. Some advocate that centers be planned to occupy poor agricultural land so that the urban areas growing up around them would also be located on poor land. However, there are still important locational restraints imposed by existing urbanization. Furthermore, there are losses of public welfare due to higher costs of urbanization on poor land.

Condition 3: The Urban Value of Prime Land, Given a Minimum Level of Accessibility, is at Least Two Times Greater Than the Agricultural Value of Such Land: In the early 1950's urban land values in areas of minimum accessibility in the San Francisco-Oakland metropolitan region were already indicated as being conservatively $2,000 to $3,000 per acre. Excluding relatively small acreages of such high-income crops as cherries, pears, and some truck crops, the maximum agricultural value of the bulk of prime land probably did not exceed $1500. By 1957 the urban value of prime land for residences in the Oakland-San Francisco metropolitan area probably varied between about $4,000 and $8,000 depending largely on accessibility.[7] Therefore, while there may be some reservations about the attainment of the full two-times differential in the early part of the period in the remotest zones, there is little doubt that the bulk of the prime agricultural acreage in the metropolitan area sooner or later became valued more than twice as much for urban uses as compared to agriculture.

Conclusions

It is apparent that the case cited in the Oakland-San Francisco metropolitan area conforms to the conditions under which exclusive agricultural zoning of prime land is not justifiable, at least so far as the present criteria are concerned. However, the analysis is limited by the fact that only two positions on a continuous curve are examined. It is possible that a more detailed analysis in a given area might indicate benefits obtainable from the location of urbanization on intermediate grades of land.

If poor land is sold at its low agricultural value, the cost of land and buildings may well be higher than the comparable cost on the best land. Under a general policy of exclusive agricultural zoning the price of a limited "poor" area for housing may be driven up to almost the price of the best land. One result is merely a new distribution of income. However, higher land prices would be responsible for an additional increment of cost to be

[7] The upper limit is based primarily on Mr. Peletz's observations of flat acreage values in areas as accessible to the Oakland-San Francisco metropolitan center as his subdivision in the East Oakland hills. However, his $8,000 figure seems reasonably in line with the results of an analysis of land values by the author in the north Santa Clara Valley, California.

borne by new housing. This would tend to further reduce the amount of urbanization and would therefore further decrease the aggregate net social product associated with a policy of exclusive agricultural zoning.

APPENDIX

Two additional issues merit brief discussion: (1) urbanization is unnecessarily scattered on prime agricultural land, and (2) urbanization on prime agricultural land causes regional dislocations of employment.

Urbanization Unnecessarily Scattered on Prime Agricultural Land. There are four types of rural-urban outcomes which may result from either planning or market processes. (1) Urbanization is consolidated on the best land. (2) Urbanization is consolidated on poor land. (3) Urbanization is scattered on poor land. (4) Urbanization is scattered on high quality land. For any specific locality the first question raised should be: which alternative can most profitably use the best agricultural land, agriculture or urbanization? If the argument of this article is correct so far, there is some presumption that urbanization can often make the best use of such land.

In the absence of specific research, either type of scatter is presumably undesirable to both agriculture and urbanization. Speculative anticipations by landholders can bring about lower levels of maintenance of fixed capital. Pilferage, drainage, insect, and disease problems may be expected to become more serious. On the urban side, scattered subdivisions may mean inadequate and relatively expensive public services, e.g., fire, police protection, libraries, playgrounds, schools, public meeting places, streets, provision of sewerage, flood control and many others. Diseconomies are brought about both for reasons of physical separation and as a result of inefficiencies in planning incident to small, piecemeal local governments.

However, the suitability of agricultural zoning to achieve consolidation of uses seems questionable. If the analyses on agricultural shortages and maximization of social product are sound, then it is presumed that linkages relating activities of urban establishments should generally determine the primary directions of metropolitan growth. This would mean that the "prime land for agriculture" criterion would no longer be universally appropriate. It is true that agricultural zoning may still be used as the tool to shape metropolitan growth. However, in its new use, urbanization could be denied entry to both excellent and poor soils, depending on a new set of over-all criteria.

Once the "prime land for agriculture" criterion is ruled out agricultural zoning would appear to be a clumsy and inappropriate way to achieve the desired relationships. In practice, the zones may be determined more by political and speculative considerations of landholders than by economic factors. Under these circumstances urban scatter may only be aggravated by zoning. Other positive policies operating more directly on the urban sector should be investigated. In those cases where agricultural considerations are predominant, e.g., in areas relatively far from metropolitan centers, agricultural zoning in its present form may be feasible.

Regional Employment Dislocations. Will declines in agriculture as a result of the urban displacement of the most productive land have serious employment repercussions via dependent industries? It is feared that regional employment would be affected more than in proportion to losses in farm labor and production. Such industries dependent on agriculture are food processing and processing of other agricultural products,

as well as suppliers of materials and equipment for agricultural production.

Three basic assumptions seem necessary to support the argument of employment dislocations: 1. Agriculture will be reduced in size. 2. Other industries cannot reliably be counted on to fill the gap in employment opportunities created by expanding populations. 3. Population increases tend to precede employment opportunities. Therefore, employment must be created or conserved to take care of the new populations.

Let us examine these assumptions with respect to California, a principal area of concern. On assumption one, undoubtedly California agriculture will decline in importance relative to other industries. But if analyses presented in Part I of this series on probable densities of future urbanization are correct, and if trends so far are continued, agriculture in the state may well increase in absolute size. As indicated by Professors Gillies and Mittelbach the outlook is for an increase of up to 6,000,000 acres.[8]

On the second assumption, experience during the last 80 years has demonstrated that agriculture has been declining in relative importance right along but other industries have been responsible for filling the gap in employment opportunities.[9] In this regard, the postwar period shows little discontinuity with the past. California's huge postwar population additions have not been supported primarily by agricultural industries but by new urban-based employment.

Finally, it is not true that population increases in California always precede expansions of industry and that, therefore, to minimize risk all sources of employment should be conserved.

"There is considerable evidence that the pronounced waves in California's rate of population growth have tended to correspond roughly, in timing and duration, with waves in the rate of expansion of economic activity in the state relative to the nation. There is also considerable evidence that the timing of the major spurts in the rate of growth has been explained largely by economic developments associated with the exploitation of unusually favorable investment opportunities."[10]

One can adopt an extreme position in which no employment risk is taken at all no matter what the cost. All current industries should be preserved even at the cost of decreases in over-all efficiency. This means that no matter how much greater differential advantage an urban use has over agriculture in the economic utilization of a given piece of land, agriculture should retain the land. This is likely to be irrational in terms of the employment objective itself if the result of such planning is to slow up the rate of urbanization. That is, the intention to prevent employment dislocations by saving industries dependent on agriculture may result in worse dislocations of employment based on decreases in urban-based employment. Reasoning from Dr. Gordon's findings, regional and even national markets for agricultural products may well be significantly affected by the loss of "unusually favorable opportunities" through cost-raising restrictions.

[8] James Gillies and Frank Mittelbach, " 'Urban Pressures on California Land' Comment," *Land Economics*, February 1958, p. 81.

[9] Margaret S. Gordon, *Employment Expansion and Population Growth, (The California Experience: 1900-1950)* (Berkeley and Los Angeles: University of California Press, 1954), pp. 38-39.

[10] Gordon, *op. cit.*, pp. 119-20.

Reports and Comments

Some Economic Considerations of the Multiple Use of Forest Land

THE United States Forest Service was established in 1905 to administer lands withdrawn from the public domain for the purpose of forestry and watershed protection. In addition, other uses which were compatible with forestry and watershed protection were provided for. Since its inception, the Forest Service has formulated the necessary policies and procedures for the management of public forest lands.[1]

At the present time American forest policy recognizes the principle of multiple use in the management of forest lands. The multiple use principle grew out of conflict over the use of forest lands for competing purposes. In 1951, L. H. Gulick stated: "The United States government has now come to a very definite general policy in the management of its publicly owned forest lands. This policy as announced officially and approved by Congress includes the principles of (a) sustained yield management, designed to produce maximum continued timber production; (b) multiple use administration, which will recognize and make a balanced place for the other uses of forest land, particularly for water conservation, recreation, wildlife habitat, and grazing; and (c) an increasing level of forest protection and improvement."[2] In the spring of 1954, the American Forestry Association adopted the following as one of its immediate goals for national policy: "To obtain the maximum of economic and social services from our forests by realistic application of the principle of multiple use in their management."[3]

By accepting the goal of maximum economic and social services from public forest lands through application of the multiple use principle, we are accepting the goal of maximum or optimum allocation of forest lands among alternative uses. This is an economic problem, the theoretical solution of which lies in the body of economic theory. Economics provides a theoretical framework for allocating a given forest area among interdependent activities. In addition, economics provided methods for practical application of the theory and for derivation of quantitative estimates of the number and level of activities that should be carried on in a given forest area.

Technical Relationships

The method by which forest lands are allocated among alternative uses depends upon the objectives of the forest manager and the relative degree to which possible competing uses promote these objectives. If the objective is to obtain maximum timber production then the manager will want to eliminate grassy parks or forest growth which has little timber value. On the other hand, if the objective is to obtain maximum stream flow then the manager would stress the elimination of woody riparian vegetation and the transfer of certain deep rooted tree growth to bunchgrasses. In some areas a relatively deep-rooted tree such as the aspen is very conducive to wildlife but of limited commercial value.[4] By eliminating aspen stands in these areas and replacing them with bunchgrasses and conifers the forest manager would be promoting commercial timber production and stream flow at the expense of wildlife support. To a certain extent trees growing on watersheds are in direct competition with irrigated farm crops and urban populations which depend upon these watersheds to

† The author expresses his gratitude to John F. Timmons and James G. Yoho for their suggestions and criticism of this paper. He is especially grateful to George A. Pavelis for suggestions in revision of this paper. The writer, however, takes full responsibility for all opinions and material presented.

[1] M. M. Kelso, "Economic Analysis of Land Use on the Western Ranges," *The Annals of the American Academy of Political and Social Science*, May 1952, p. 135.

[2] Luther H. Gulick, *American Forest Policy* (New York: Duell, Sloan and Pearce, 1951) p. 31.

[3] Samuel T. Dana, "The American Forestry Association's First Eighty Years," *Journal of Forestry*, March 1956, p. 70.

[4] Ralph R. Hill, "Wildlife Management in Relation to Multiple Use," *Journal of Forestry*, March 1955.

supply their needs for water.[5] Both a competitive and complementary relationship exist between timber production and stream flow. Too much timber harvesting as well as too little will decrease the useful flow of water.

In general, there is sufficient summer range in the Western mountains for both game animals and livestock at reasonable levels. However, conflict may arise in local areas due to overstocking. The problem may also become complicated by insufficient forage on winter range used by livestock and wildlife. A manager interested in increasing livestock forage production would be interested in more grass cover and less shrubs for winter deer forage. This would tend to restrict wildlife production. On the other hand, where deer herds (or any group of wildlife) are allowed to reach a size that may conflict with grazing, such a large burden may be placed upon the forest land to provide forage that desirable plant life may be eliminated and be replaced by growth that is undesirable for maximum timber harvest or for maximum forage production for either livestock or wildlife. In addition, conflict may arise between recreation and livestock grazing. In most instances they do not conflict. It is only when demands for recreation attain major proportions that special consideration must be given to the level of livestock grazing relative to recreation.[6]

In addition to the various surface uses of forest lands the utilization of subsurface resources may at times represent an important alternative use. At one time or other mining activities have been carried on in most of the Western watersheds. Mining where it is of small scale may pose no problem in the allocation of forest lands because it would represent a supplementary activity and not interfere with other uses of the land. However, as known mineral deposits are depleted and technology devises new ways of using minerals, forest lands may be found to contain many strategic minerals which command a value high enough to warrant large scale mining operations. If subsurface activity is necessary for strategic minerals and society places a high enough value on these minerals, then this use rightly becomes a competitor for forest lands. Account must be taken of this in any decision concerning the use of forest lands for the general welfare of society.

It is evident that conditions necessary for maximum timber production, maximum livestock production, or for maximum stream flow are not compatible with the maximum output of any other product, e.g., wildlife. What is necessary under the multiple use principle is to obtain a joint maximum for the alternative uses.

Theoretical Criteria for Allocation[7]

Factor-Product Relationship. Each activity, if carried on independently of the others, would be carried to the point where marginal returns equal marginal cost, i.e., where the net value product for using forest land in the particular activity is the greatest. This is shown in Figure 1 by point A where the gross value product (line OV) is furthest from its corresponding point on the total outlay line below (line OO.) Any point to the left of A would not be as profitable as A because marginal returns would be rising faster than marginal costs. Neither would any point to the right of A be as profitable as A. This is because movement away from A to the right increases costs faster than it increases returns. Therefore, OA_1 is the level of activity that should be carried on in order to maximize profits. At OA_1 the marginal rate of trans-

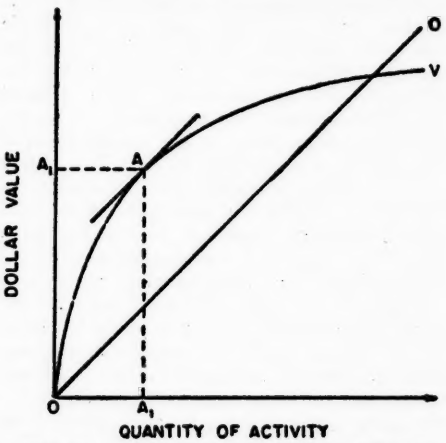

FIGURE 1—The Relationship Between Total Returns and Total Outlay for a Given Activity.

[5] D. W. Wingfield, "Trees Versus Water and Grass," *Journal of Range Management*, July 1955.

[6] W. R. Chapline, "Multiple Use of Summer Range and the Place of Research in Range-Land Conservation," *Journal of Forestry*, October 1943.

[7] It is assumed for this discussion that we have perfect competition and a given income distribution.

forming forest land into the given activity (product) is equal to the ratio of the resource and product prices. This condition is necessary for the optimum transformation of forest land into any product, e.g., recreation or timber.

Product-Product Relationships. Since we are dealing with more than one alternative use, we must consider the possibility of substituting one use for another until the joint net returns are maximized. For any given amount of forest land, the marginal rate of substitution of one activity for another must be equal to the value ratio for these two activities within a given time period. Figure 2 illustrates this concept. Line I-I represents the iso or equal resource relationship between any two

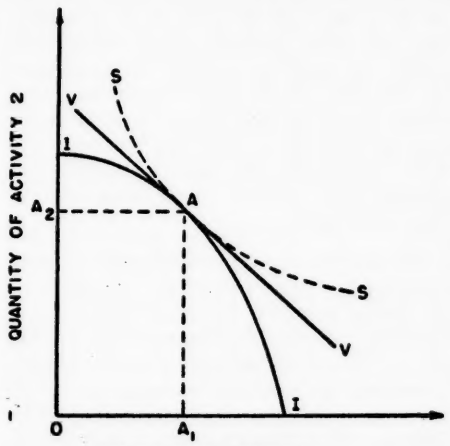

FIGURE 2—Production and Value Relationships Between Two Activities in a Given Time Period.

activities. The line is drawn with only the competitive range showing because it is the relevant section of the curve. Even if the two activities have a complementary range, and some of the possible alternative uses of forest land do have such a range, the activities would be pushed over into the competitive range in order to maximize net returns. Line VV represents the value ratio (price ratio) of the two activities. If the market values are considered to be the relevant choice criteria, then the maximizing position is point A with activity 1 at level OA_1 and activity 2 at level OA_2. If, on the other hand, market values are not adequate or relevant, the preference system of society (line SS) can be used as a choice indicator in place of the market price ratios. Society's preference system is pertinent in the case of administered prices as well as that of free market prices. If prices are freely determined, consumer equilibrium at point A will result in a price ratio equivalent to the marginal rates of substitution in consumption and production. If prices are not freely determined, an equilibrium at some point other than A may be achieved at the expense of consumer welfare. Figure 2 indicates that market prices are allocating resources in exactly the proportion preferred by society.[8] Once point A is found, depending upon the relevant choice indicator, for every combination of activities, the system will be in equilibrium and forest land allocated to the various activities at the optimum levels.

Time Considerations. It is expected from the nature of the various forest uses that the returns or benefits from each activity continue into the future. The demand for water, timber, recreation, and livestock will most likely increase in the future. Therefore, it is necessary that we consider the allocation of forest land between time periods.

Present production of timber competes with future production of timber; present levels of grazing compete with future levels; and the same can be said for the remaining activities. Figure 3 illustrates this competitive relation-

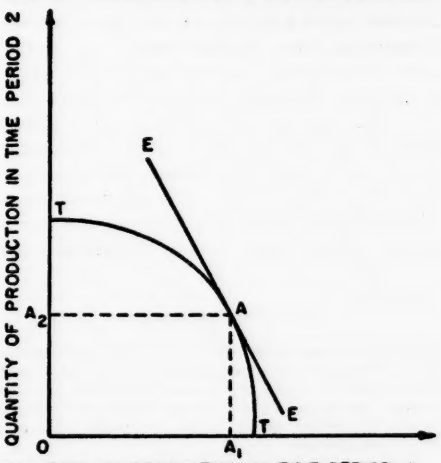

FIGURE 3—Production and Value Relationships Between Time Periods for a Given Activity.

[8] Market prices may not allocate resources in a manner preferred by society. However, where market prices are

(Continued on page 266)

ship over time together with the theoretical basis for allocating forest land over time. The slope of line TT (iso or equal resource line) represents the marginal rate of substitution of an activity in time period 1 for the same activity in time period 2. Line EE represents the discounted price relationship of the given activity in time periods 1 and 2. The optimum point turns out to be A with OA_2 of the activity being produced in time period 2 and OA_1 produced in time period 1.

To summarize briefly, we must have the following conditions for optimum allocation of forest lands among competing uses: (1) the marginal rate of transformation of forest land into any activity equal to the ratio of the resource and activity prices, i.e., the rate at which the forest land resource is transformed into timber must be equal to the ratio of the price of forest land per unit to the price of timber per unit; (2) the marginal rate of substitution of one activity, e.g., timber, for another activity, say wildlife, must be equal to the ratio of society preference for the two activities as measured by the slope of the indifference curve or the price ratio line as a first approximation; (3) the marginal rate of substitution of an activity, say timber, in one time period for the same activity in another time period must be equal to the discounted price ratio in the two time periods. Essentially, the "public firm" (a public agency controlling a given forest area) which is trying to maximize net social product over time in accordance with stated policy will be attempting to maximize the discounted stream of net social benefits which accrue to the "firm" from its use of public forest land. Theoretically these benefits will be maximized when the above conditions are realized.[9]

(Continued from page 265)

available they may reasonably approximate society preferences although this may not always be true. The "best" choice indicator would be the actual preference system of society. But, because of the obvious difficulty of measuring society preferences, market prices are usually taken as a first approximation.

[9] The above discussion has been concerned with necessary conditions only. In equilibrium, both the sufficient and total conditions must hold as well. Sufficient conditions are in general concerned with the shape of the production curves. The total conditions specify that the firm is fully aware of the state of technology and the processes it is using are those which provide maximum profits. Since we are concerned here with forest land only, the theoretical relationships between forest land and other resources such as capital and labor have been omitted. However, any application of the theory must take these resource relationships into account.

Suggested Methods for Application of Criteria

Estimation of Production and Value Relationships. The theoretical framework gives criteria by which to judge the optimum levels of each of the alternative uses. However, when we try to apply the criteria, we run into the usual problems of establishing production relationships and adequate choice indicators.

The production relationships may provide the least difficulties. Studies by range and forest specialists are necessary to obtain reliable estimates of the various technical relationships. An example of the application of economics to range data is the recent work of John A. Hopkins.[10] In 1954, he used range data on the level of cattle and sheep stocking to derive estimates of the optimum combination of cattle and sheep on a particular range. Another example of the application of economics is the work of Gregory with forest data.[11] In order to meaningfully apply economic principles we must first have reliable technical data regarding the input-output relationships between forest land and its alternative uses.

Perhaps the biggest problem will be found in locating a choice indicator. The problems of placing a market value on such items as the aesthetic value of wilderness travel or the time value of stream flow are well known. Some feel that precise values cannot be placed on many items and it is erroneous to base judgments on assumed values. However, in most instances it should be possible to obtain approximate market values for almost any activity. Even an activity such as wilderness travel can be given a quasi-market value which would at least equal the out-of-pocket expense of getting to and living in the wilderness, as well as possible income foregone. If this is unsuitable, the possibility arises of establishing the relevant iso-resource curves and allowing the interested parties to

[10] John A. Hopkins, "Economic Criteria for Determining Optimum Use of Summer Range by Sheep and Cattle," *Journal of Range Management*, July 1954.

[11] G. Robinson Gregory, "An Economic Approach to Multiple Use," *Forest Science*, March 1955.

select the level of activity. Figure 4 illustrates this point. Once the relevant iso-resource curve has been established, it can be presented to those making the decisions on forest land allocation for their selection of the desired level of use. One might desire use at the level and ratio of W, another at that of X or Y or Z. Immediately, it can be seen that only Z which is tangent to the iso-resource curve is relevant for this case. The other possibilities all represent desired uses at levels beyond that technically possible. It might be that W would prefer W[1] to Z since at least this would represent the ratio of his subjective value of the two activities. Numerous possibilities could exist, but at least they would be narrowed to those that are technically possible.[12]

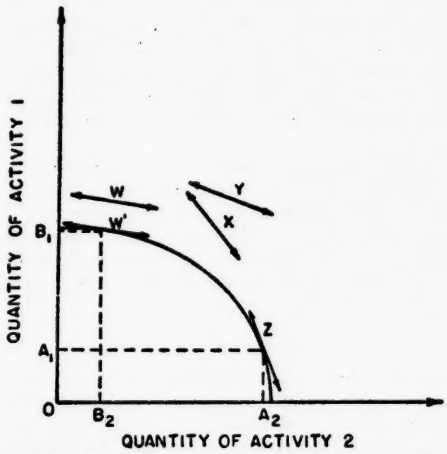

FIGURE 4.—Production and Alternative Value Relationships for Two Activities in a Given Time Period.

Cost-Benefit Analysis and Programming. There are two other economic methods that should be mentioned as alternative ways of allocating forest land among competing uses or activities. The first is the cost-benefit analysis concept that has been used many times in multiple-use river development projects. Since this method is well-known and its application to the present problem is essentially no different than application to river developments or multiple-purpose dam projects, it will not be discussed here except for one remark. One of the central problems of the cost-benefit analysis is the allocation of joint costs. Methods of dealing with joint costs have been well outlined in the literature but in the final analysis these costs are rather arbitrarily assigned.[13]

The second method of allocating a multiple use resource is that of activity analysis or linear programming. Activity analysis seeks to maximize a given criterion subject to various restraints or restrictions such as the amount of forest land or the amount of capital available for use in the activities under consideration. Programming is concerned with allocating scarce resources among interdependent activities in such a way as to maximize a given set of criteria. In the usual application of programming, the criterion is a profit function. However, there is no reason why it must be a profit function. It could just as well be some other criterion such as a consumer preference (utility) function. The programming solution shown in Figure 5 is essentially the same as that found in ordinary economic analysis. In this particular case, activities are being selected so as to maximize profits. Lines FF, LL, and CC are iso or equal resource lines for forest land,

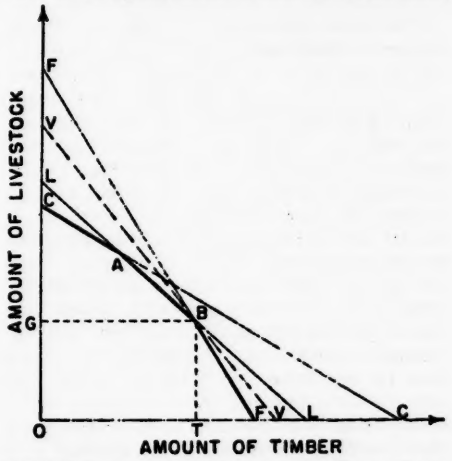

FIGURE 5.—Optimum Allocation of Forest Land, Capital, and Labor Among Alternative Activities Through the Use of Linear Programming.

[12] For a more detailed discussion of valuation problems, see John A. Hopkins, "Use of Economics in Making Decisions Relating to Range Use," *Journal of Farm Economics*, December 1956; and C. V. Plath, "Use of Surveys in Economic Research in Forage Production for Grazing," *op. cit.*, December 1956.

[13] For a more detailed discussion of cost-benefit analysis as related to river projects see John F. Timmons, "Economic Framework for Watershed Development," *Journal of Farm Economics*, December 1954.

labor, and capital, respectively. Line FF represents all possible combinations of livestock and timber that can be produced with a given amount of forest land. Lines LL and CC represent all possible combinations of livestock and timber that can be produced with given amounts of labor and capital, respectively. Under the assumptions of linear programming these lines are straight indicating constant marginal rates of substitution for timber and livestock. Line CABF represents the iso-resource curve for timber and livestock when all resources are considered. In the range CA, capital is the limiting resource. Between A and B, labor is limiting. From B to F, forest land is the limiting factor. Line VV is the iso or equal value line, the slope of which is the ratio of the value of a unit of timber to the value of a unit of livestock. The profit maximizing position is located by the tangency of the iso-value line (VV) and the iso-resource curve (CABF). In this case, OG units of livestock and OT units of timber will maximize profits. This solution is similar to that shown in Figure 2 and indicates the similarity between linear programming and the theoretical criteria. Figure 5 gives the maximizing position for only two activities. The linear programming technique can handle any number of activities but it is difficult to go beyond the two activity case graphically.

One important aspect of the usual programming problem is that no more activities will be needed to maximize profit than there are limiting resources (although if we maximize a preference function all activities may be needed). Where some activities are not needed to maximize profit, the method gives an estimate of how much it would cost to engage in these activities. For instance, if timber and livestock were the two activities needed to maximize profits, the cost of carrying on the other activities would be readily obtainable. In reality of course, stream flow cannot be stopped and started but only increased or decreased. Moreover, recreation may be supplementary with the other uses over a wide range and thereby always represent a feasible activity. These are problems that must be worked out if the method is to be used.

For future planning of a given forest area and research needed in that area, programming can again be applied. A method has been outlined by Professor Heady by which programming can be used to specify areas of needed research.[14] By examining a completed program for a given forest area the most restrictive activities can be specified and research directed in these areas in an attempt to lift the restrictions which will allow increasing profit or level of satisfaction. Tentative programs can be established and the whole problem of forest land allocation examined by making any desired changes and examining the effects of these changes on the program.

Programming is merely an enlargement of a budget analysis. Budgeting is suited to small problems or where intuitive judgment is not likely to be easily confused. Programming, on the other hand, finds its forte in large scale problems—and this is the nature of forest land allocation.

Conclusions

This paper has attempted to briefly indicate some of the technical problems that exist between various forest activities and establish an economic framework for analyzing forest land use problems. In addition, it has indicated some possible methods of deriving quantitative estimates of the optimum level of each relevant activity. The next step is to gather empirical data and, using one of the alternative methods, to indicate how a given forest area should be allocated considering the assumptions and restrictions appropriate to the given area and its possible activities.

Economic theory and the methods of applying this theory are not a panacea for forest land use problems. We cannot expect to put data into our formulae and have them grind out the correct answers. Quantitative estimates and methods have their limitations, particularly in the social sciences. There are too many variables and intangibles involved in problems of the sort considered here in order for them to be solved by formula. However, if we are to improve our ability of carry out national policy objectives, we must eventually turn to quantitative estimates. With proper care and judgment based upon experience, good quantitative results can represent a real aid to decision and management.

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[14] Earl O. Heady, "Economic Concepts in Directing and Designing Research for Programming Use of Range Resources," *Journal of Farm Economics*, December 1956.

Funding of Building Amortization and Site Clearance Costs: A Proposition†

FLORENCE KLUCKHOHN has suggested three relational principles which we may use as analytic elements in describing man's relations with other men: the lineal, the collateral, and the individualistic.[1] The lineal is derived from age, generational differences and cultural tradition; the collateral, from laterally extended relationships, immediate in time and place; the individualistic, from individual goals as yet unrealized, depending upon present action for future attainment. All societies, Kluckhohn notes, give some attention to all three principles, but their varying emphases may be used to characterize different cultures. In the terms of this analysis the dominant American pattern gives first place to the individualistic, followed by the collateral and the lineal.

If we take the physical structure of the human dwelling to be an architectural embodiment of these relational principles,[2] we infer that housing policy should provide for a flexible expression of the value orientations which look to the past, to the present, and to the future. Dwelling structures which are authentic integrations of past values should be preserved in the measure that our culture places value in the past; old and new structures should be accommodated to each other and harmonized in the collateral present to the degree that our esteem of our neighbors —and our esthetic gifts—permits; and the aspirations for the future should find expression in ultramodern dwellings to the extent that we live for the future.

Housing policy would serve society best by allowing the last owner of an aging dwelling a rather wide range of time within which he might remove the structure from the site without incurring undue economic loss and without burdening future users of the site with costs of past use. Certain parts of our urban areas are such in site character as to remain residential throughout the city's lifetime. In these parts, under an ideal housing policy, individual owners' preferences would account for a wide range of replacement ages for dwellings. In other parts of cities, changes of land use would be of major importance. Ultimately, periods of decline in all cities subject residential areas to changes in site use. Despite the best efforts of planners, changes of land use may arise from unanticipated causes which introduce an element of contingency.

Taking a cue from such laws as those for workmen's compensation and old age benefits, the writer offers for discussion a highly speculative and oversimplified proposition—the intent of which is to free the owner of an outmoded dwelling structure either (1) to clear the site for other desirable use or (2) to replace the structure with a new one embodying the technological advances of the day.

The Proposition

Funding of the costs of clearing the site and of some part or all of the depreciation of the original cost of the dwelling and of any subsequent improvements would be required by law. The fund would earn interest at a rate below the average return on capital. Title to the fund with respect to each dwelling structure would run with title to the structure, but private liens upon the fund would be restricted or prohibited. Access to this fund could be gained by the current owner only upon demolition of the structure and clearance of the site; but, upon satisfactory performance, the fund would become available to him for his unrestricted use.

A minimum program might provide for funding of demolition and site clearance costs only. A moderate program might add to this a funded amount sufficient to cover a down payment for the financing of new construction. A complete program would amortize the full cost of initial construction and any additions, plus the costs of demolition and site clearance and would, in effect, provide that investment in a fixed asset, housing, could be converted only into another form of fixed asset (the fund) and could not be diverted to current expenditure during the period of ownership and as long as the

† Because the writer's main interests lie in political philosophy and public administration, and in current lecturing in social work research at the Graduate School of Social Work of the University of Washington, this article is from an amateur's viewpoint. With the temerity of ignorance the author presents a novel proposal for discussion.

[1] "Value Orientations," *Toward a Unified Theory of Human Behavior*, ed. Roy R. Grinker (New York: Basic Books, Inc. 1956), pp. 87 ff.

[2] This is not to imply that all other physical structures erected by man do not embody these relational principles. The proposal made in this article is limited to dwelling structures for esthetic and economic reasons.

physical structure remained in place. A still more comprehensive program, designed to take up part or all of the long-term decline in the purchasing power of the dollar would provide for continued payments and continued accumulation of the fund until the structure was demolished. Certain exceptions, as for historical sites, would be indicated in any such program.

Under constitutional limitations, a federal program would be restricted in its coverage, but might be set up as a requirement for any financing which derived in whole or in part from federal funds. A state program might be set up under the taxing power, inasmuch as wide variations in property tax rates between states and between cities already exist without undue ill effects.[3]

The fiscal, monetary, and cyclical or countercyclical effects become of increasing concern, as the financial coverage of the proposal is broadened. If we assume a comprehensive coverage, we might estimate that, after the program had been in effect long enough to approach stabilization, credits in the amortization fund would amount to approximately 35 percent of the total cost of all dwelling structures—a huge sum.

Thd theoretical mean coverage of the fund would be 50 percent, but the statutory period of amortization would depend upon political agreement and would probably be set at somewhat longer than the actual average of dwelling life under the plan. Further, new construction occasioned by population growth would keep the average coverage below the theoretical mean.

Although full coverage might result in a fund of around 35 percent of the total cost of all dwellings in the jurisdiction served by the program, the coverage with respect to any specific piece of housing could be expected to exceed twice that, or 70 percent of the cost, at the time of demolition and site clearing. Any accurate forecast as to how this would work out in practice would be difficult, for the rate of housing liquidation could be significantly affected by the program, and the rate would, in any case, be subject to changes based upon architectural evolution, the technology of housing construction, the general standard of living, and the cultural orientation towards the past or the future, itself a variable. Public policy as to the amortization period would, we can presume, seek to achieve a high economic utility of the funds released upon demolition.

By providing for tax liens against the amortization fund, and by basing taxes upon the combined value of the title (land, improvements, and accumulated amortization fund) two desirable results might be obtained: (1) tax foreclosures and the uneconomic rental competition of tax-delinquent properties would be eliminated, for the property-tax could in no event be avoided and (2) the tax take would remain, ceteris paribus, relatively stable, as the tax base remained stable; and marginal rents would include a relatively stable tax cost instead of a reducing one.[4]

An intended feature of the proposal is that it does not *compel* demolition, nor require use of the funded depreciation reserve for replacement. The object is to set up an increasing fund, allowing the owner a considerable range of time within which to make use of his money —according as he places a high value on the traditional or on the modern, and according as the market places a high value on present use of the site or on a different use. In all but exceptional cases the rising curve representing the accumulated amortization fund would intersect the curve of value-in-use with respect to the current owner and the current land use, and the owner would prefer to gain access to the fund by demolishing the structure and clearing the site. We can hypothesize that the rising value of the fund would induce owners to shorten somewhat the period of acute obsolescence during which maintenance is commonly neglected. And this might well improve the level of maintenance on all residence property.

Conclusion

It is impossible in a short paper—and in the writer's state of knowledge of the economics of housing—to do more than raise a few interesting points. Whether the funding should be done by a public agency, or merely be compulsory under private trust corporations; whether the funding would be compat-

[3] Possible ill effects from differing rates in parts of bi-state or tri-state metropolitan areas are disregarded here.

[4] In terms of the monopolistically competitive theory of urban property values and of George Duggar's analysis in "A Framework for the Analysis of Urban Development Policy: Some Financial Factors in Local Programs and Some Implications," *Papers and Proceedings, II (1956) Regional Science Association*, pp. 210-224. the writer hazards that the main effects would be a reduced migration of the desirable points around which monopoly valuations cluster and some reduction in the proportions and motivating force of the disequilibriums noted by Duggar.

ible with fire insurance and other insurances or whether an integrated plan would be needed; whether transient housing should be covered; whether the interest income on the amortization fund should, under certain circumstances, be paid out to aged resident owners; whether this or that feature would have this or that result—these are questions which call for study. Definition of the "cleared-site" status is a complex technical problem, even in contemplation.

The legislative aim of the proposal is based upon three ideas: (1) that demolition and site clearance costs of an outmoded dwelling are properly chargeable against the users of that dwelling rather than against subsequent use of the site, (2) that demolition of an outmoded dwelling and clearing of the site are desirable social acts, and (3) that certain acts which represent a desirable acceptance of social responsibility (in this case, the funding of certain housing costs) are economically possible or prudent for the individual citizen only if all citizens are equally required to perform them. The element of compulsion enters, in the required funding of housing depreciation and removal costs, but it enters in the citizen's behalf. By so doing it might free him to keep his housing investment in a better safeguarded form and it might provide his municipal corporations with a more flexible, continuous, and responsive form of urban renewal.

A Hypothetical Example

The statutorily required rate of funding is set at 1 percent of the initial cost of construction, plus added or remodeling costs, as distinguished from maintenance or fire-loss replacement. The funding tax is placed on all structures constructed or used primarily for dwelling purposes, costs being estimated on all existing structures. Interest at 2½ percent compounded annually is credited to the accrued account for each structure. No maximum is set; the annual funding tax and the accumulation of principal and interest continues until the structure is removed and dismantled. No integration of this fund with fire or other damage insurance is attempted. The case under study is a $20,000 residence, with a demolition cost of $500.00.

APPROXIMATE DOLLAR VALUES

At end of	*Amortization Fund Total*	*Annual Interest*	*Net Increment to the Value of the Title*
10 years.....	$ 2,320	$ 58	$ 1,820
20 years.....	5,266	132	4,766
30 years.....	9,039	226	8,539
40 years.....	13,869	347	13,369
50 years.....	20,047	501	19,547
60 years.....	27,960	699	27,460

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Results of a Test of Air Photo Interpretation as a Tool in Farm Management and Land Economics Research

AIR PHOTOGRAPHIC analysis is a recent scientific development which serves as a useful tool in planning development of natural resources. Throughout the United States large areas have been photographed by the United States Department of Agriculture for a wide variety of uses by its agencies. These photographs are available also to state agencies and private individuals. In recent years they have been widely used in studies dealing with forestry, city planning, engineering and soil mapping.

They have been used to some extent in farm management and land economics research but have been limited primarily to individual farm planning and obtaining data on land clearing and drainage. A test project was recently carried out by personnel in the Department of Agricultural Economics at Cornell University in an attempt to broaden the use to which air photographs may be put in farm management and land economics research. The results obtained have been applied to farm management and land economics surveys currently underway in New York State.[1]

[1] The most recent aerial photos available are being used in a study of agricultural regions and sub-regions in New York State. The photographs were used in field reconnaissance work as an aid in describing the agriculture and in delineating regional boundaries. This project is being carried out by the author under the direction of H. E. Conklin, Associate Professor of Land Economics, Cornell University. In addition, these photos are being used to construct road segments in the Plateau Regions of New York State, the universe for a current farm management survey being carried out by L. C. Cunningham, Professor of Farm Management, Cornell University.

An Agricultural area in the Township of Danby, Tompkins County, New York was chosen as the universe for this study. A control area and a test area were laid out. Air photographs taken in 1944 were used to study these two areas. The control area was used to study the type of farming in this area and to develop the procedure to be used in the test area. Data obtained in a 1948 land economics survey, which included all farms in the Township of Danby, were used to evaluate the accuracy of the photo interpretation. This area is rapidly passing out of full-time farming, however, and allowances had to be made in the acreage of abandoned land (which was increasing in the period from 1944 to 1948).

Procedure for the Control Area

The control area was covered in detail in the field and information contained in 1948 land economic survey records of farms in the area were compared to the aerial photographs. This process included: (1) Location of active farm headquarters and identifying type of farming. (2) Identifying, as far as possible, the farm boundaries. (3) Delineation of nonfarm areas, including urban areas, abandoned land, etc. (4) Delineation of active farm land areas and noting the appearance of tillage, pasture and idle crop land in the field and on the aeriai photographs. (5) A comparison of data obtained from aerial photo interpretation and data from the 1948 survey. The control area was divided into three classes: (I) Woods, swamps, residential. (II) Abandoned land and land used for part-time farming. (III) Areas made up of full-time farms.

The acreage within each of the classes was estimated through the use of grid pattern overlays (see Table I). Within group III (the active farming areas) a breakdown was made according to land use. These data were then compared to a summary of the 1948 record data (Table II).

A comparison of these two sets of data showed a close similarity. The idle crop land figure was higher in the 1948 data. This was due in part to identification error but also due to a change in land use from 1944 to 1948, a period when this area was rapidly moving out of full-time farming. This pointed out the necessity of having up-to-date photographs. Note, however, that in spite of the variation between the components, the total area figure in Class III (based on aerial photographs) was greater than the data from the 1948 survey by only 127 acres. Prior to moving to the test area, the control area was again field checked. The information obtained was carefully evaluated to plan the procedure for the test area.

TABLE I—Acres In Each Class: Control Area

Class	1944 Air Photo Data		1948 Survey Data	
	Acres	*Percent*	*No. of farms*	*No. of farms*
I (wood, swamps and residential)	3,533	39.6	0	0
II (part-time and abandoned farm areas)	3,202	35.9	0	0
III (full-time farm areas)	2,189	24.5	12	12
Totals	8,924	100	12	12

TABEL II—Land Use In Group III: Control Area

Land Use	1944 Air Photo Data		1948 Survey Data	
	Acres	*Percent*	*Acres*	*Percent*
Tillage and pasture	1,516	76.8	1,324	71.7
Idle crop land	187	9.5	414	22.4
Other	270	13.7	108	5.9
Totals	1,973	100	1,846	100

Procedure for the Test Area

The test area was not visited until after the evaluation phase had been completed, all work being done entirely with aerial photographs. A stereoscopic check was made in each of the steps listed below. The estimates obtained in this manner were compared to the 1948-record data. At this point the test area was checked in the field in order to crystallize our thinking on the results obtained. The general procedure follows:

(1) *Classification According to Land Use.* The test area was divided into three groups in the same manner as in the control area (see Table III). This step made it possible to limit detailed observations to Class III areas for the remaining steps, thereby speeding up the work.

(2) *Identifying Type of Farming.* The land use pattern and such criteria as cow paths, active barnyards and evidence that manure was being spread frequently indicated dairying was the major type of farming in this area. Some signs of poultry were also noted.

TABLE III—ACRES IN EACH CLASS: TEST AREA

Class	1943 Air Photo Data			1948 Survey Data
	Acres	*Percent*	*No. of farms*	*No. of farms*
I (woodland, swamps and residential)	2,810	33	0	0
II (part-time and abandoned farm areas)	1,633	19	1	1
III Full-time farm areas)	4,034	48	19	21
TOTALS	8,477	100	20	22

(3) *Location of Active Farmsteads.* A general check was made of the group II areas in order to determine if any active farmsteads had been included. One poultry farm was located but allowed to remain in group II as most of the land on this farm was idle.

In the group II areas, a systematic check was made and all building concentrations were identified. Each place was then examined stereoscopically and classified as either a farm, part-time farm or rural residence. A short, written evaluation was compiled for each set of buildings. Nineteen of the thirty-five locations were designated as full-time farm operations. During this step a list of distinguishing characteristics of active farms was compiled. Although a general overall appearance is considered, the following indicators were found especially helpful in identifying full-time commercial farms: (a) Conditions of roadways, driveways and lanes. In general the lighter the tone, the greater the farm activity. (b) Proximity of drives to barns, sheds and fields, with special emphasis on amount of use made of them. (c) Location of cow lots and pasture areas with evidence of their use, including worn areas around shade trees, watering areas and feed bunkers, as well as the number, size and tone of cowpaths. (d) Location, size and arrangement of fields, especially percentage of land under tillage. (e) Topography, erosion signs and drainage pattern in fields, often a clue to abandonment. (f) Location and amount of idle land; tone and /or presence of brush in fields with an overall dull tone is a good clue to abandoned land.

(4) *Calculation of Land Use Information.* With the use of grid overlays, land use data were calculated for the class III areas (Table IV).

TABLE IV—LAND USE IN GROUP III: TEST AREA

Land Use	1944 Air Photo Data		1948 Survey Data	
	Acres	*Percent*	*Acres*	*Percent*
Tillage and pasture	3,385	84	3,075	79
Idle crop land	385	10	629	16
Other	264	6	212	5
TOTALS	4,034	100	3,916	100

(5) *Construction of Road Segments for the Group III Areas.* Road segment sampling designs[2] have been used in recent farm management surveys in New York State. In this study segmenting was limited to the group III areas although the universe included the entire test area, on the assumption that all farms within the test area had been included in the group III areas. Five road segments were constructed. (Table V).

TABLE V—FARM YIELD OF ROAD SEGMENTS IN GROUP III: TEST AREA

	1944 Air Photo Data	1948 Survey Data
Segment No.	*No. of farms*	*No. of farms*
1	5	5
2	2	3
3	5	6
4	1	2
5	6	5
TOTALS	19	21

(6) *Comparison of Results with 1948 Data.* The information compiled in the above steps was compared to the 1948 survey data and is summarized in Tables III-VI. The 1948 data indicated 21 active farmsteads in the

[2] The standard method has been to divide all roads within a selected universe into segments containing approximately 5 farms each. A sample of this universe of road segments was then chosen at random and farm management survey records obtained from farms within the selected road segments.

group III areas, compared to an estimate of 19 based on aerial photo interpretation. One unit was classified as a farm which was listed as a part-time operation in the 1948 data. Another unit was classified as a rural residence because there were no farm buildings on the place. The 1948 data listed this as the headquarters for a crop farm made up of non-contiguous land parcels.

Comparison of land use data for group III areas showed a close similarity. The greatest difference lies in the figures for tillage and idle land. The 1958 data showed a lower figure for tillage and a higher one for idle land than the data obtained from the 1944 photos. This was to be expected as this area was moving out of agriculture during this period. Note, however, that the total acreage figures differed by only 118 acres.

Table VI shows that roads in the farming areas (group III) make up 32.6 and 54.8 percent of all roads in the control and test areas, respectively. Group III areas in the control area contained all of the farms and in the test area they included 21 out of a total of 22 farms. (The farm that was left out was noted in the checking phase and could have been included.) The group III areas in the test area, as delineated, contained 54.8 percent of the roads and 95.5 percent of the farms. In other words, almost complete coverage of all farms in the test area could be achieved by covering a little more than half the roads.

TABLE VI—Miles of Roads In Selected Areas: Township of Danby, Tompkins County, New York

Class	Control Areas		Test Area	
	Road Miles	*Percent*	*Road Miles*	*Percent*
I.....	23.8	19.5	19.9	16.2
II.....	58.3	47.9	35.8	29.0
III.....	39.7	32.6	67.6	54.8
Totals.....	121.8	100	123.3	100

Application of Findings

The data obtained were considered sufficiently accurate to recommend the use of aerial photographs as a suitable tool in farm management and land economics research. They can serve a particular use in describing agricultural regions and in preparing sample designs for field surveys. Some conditions must be met, however, in order to realize the full potential of air photo interpretation. They include: (1) Recent air photographs are necessary and stereo coverage is preferred. (2) Interpretation of air photographs requires special training combined with a thorough understanding of farming practices in the area under study. (3) Ground checks are necessary.

Several specific uses for air photo interpretation in farm management and land economics research include: (1) Compiling information for describing agricultural areas: viz., (a) Classification of open-country areas according to intensity of land use. (b) Identification of type of farming. (c) Identification of active farm headquarters. (d) Classification of active farmsteads in terms of income expectancy. (e) Identification of farm boundaries (in cases of contiguous operations). (f) Estimation of the intensity of land use and acreages of various crops on farms. (g) Estimation of the degree of urban penetration and condition of roads in rural areas. (2) Construction of sample designs for farm management and land economic field surveys: (a) Excluding non-agricultural areas such as abandoned land, swamps, public owned land, cities and villages from the universe. (b) Locating farm headquarters to serve as a guide in constructing road segments. (c) Locating a selected universe of farms within an agricultural area; for example, locating a universe of poultry farms in a given county. (3) Carrying out a study of change in land use and farming practices in an agricultural area through the use of two sets of photographs taken at different times. (a) Degree of urban penetration into rural areas. (b) Degree of abandonment or new land clearing and drainage. (c) Degree of part-time farming and change in type of farming.

At the present time two research projects which embody the first two uses of air photos recommended above are being carried out by personnel in the Department of Agricultural Economics at Cornell University. A statewide project is underway in which agricultural regions and sub-regions are being delineated and described in terms of their agricultural characteristics. Recent (1951 or newer) aerial photographs have been purchased for twenty-seven counties and are being used extensively in this project. A farm management project also is currently underway in the hill-and-valley country in

the south central part of the state. This is a universe of approximately eight and one-half million acres. The boundaries of the agricultural regions included in this study were delineated on aerial photographs, with a minimum of field checking. Residential areas were also excluded from the universe in this manner, thereby realizing a significant saving in time and money.

No studies of change in land use or farming practices have yet been undertaken but the necessary materials are available, notably two sets of photographs for several areas in the state.

Summary

An overall evaluation of the experience compiled in this test project indicated that aerial photographs have a definite place in farm management and land economics research. Like most tools, however, they require trained operators. The full potentialities of aerial photography can be realized only through the use of a stereoscope and field checks, either by ground or aerial reconnaissance. There is reason to believe that considerable expansion in the use of aerial photographs in farm management and land economics research will take place in the near future.

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Book Reviews

Economic Survey of Montgomery and Prince Georges Counties, Maryland. By Homer Hoyt. Maryland National Capitol Park & Planning Commission, Silver Spring, Md., 1955—$4.05.

At a time when many central cities are fast approaching maturity, and many metropolitan counties are experiencing extremely rapid and all too frequently unguided growth, city planners, city and county fiscal officers and policy making elected officials should give increasing attention to the relationships between municipal fiscal health and the physical pattern of land uses and public services. *Dr. Hoyt's Economic Survey of Montgomery and Prince Georges Counties, Maryland* is one of the earliest and best studies made in the United States showing the effect of the economic base upon past and projected future population growth and upon land use patterns.

The cause and effect relationship between land use and economic base is so fundamental to any urban planning program that it is difficult to understand why many more studies such as the one here considered have not been completed or undertaken by or for planning agencies throughout the country. If this reviewer may be permitted a most general observation, it is that in terms of the relationships between urban planning, municipal budgeting, both operating and capital, and property assessing and tax gathering in the cities of this country, all too frequently those involved with specialized parts of the overall job of making cities work and at the same time pay their way and meet ever expanding costs of local government, fail to fully recognize the value of what the others are doing or could be doing toward achieving their common goals. For example, one of the country's best known city managers has said that many public finance officers throughout the country have little understanding of or interest in urban renewal as one way toward achieving a sound and stable urban tax base. Recognition is being given by the Federal Housing and Home Finance Agency to this problem in recently approving a substantial research grant for the study of the economic effects of urban renewal. A better understanding of the basic relationship between land use, condition or buildings and environment and tax income is one of the most vital requirements in urban planning today.

In view of the above, an economic base survey such as that of Montgomery and Prince Georges Counties serves a much needed example for other planning agencies to follow. The comprehensive compilation of economic data on a land use and geographic basis is logically not only one of the first steps in the overall planning process but provides also one of the soundest guides for a policy making body to follow in deciding on a comprehensive urban development plan and zoning plan.

Dr. Hoyt's survey leads him to a basic conclusion that sound urban planning and design —in all its ramifications—residential, industrial, commercial, recreational and highway planning—is good business for the community. Upon such conclusions must rest increasingly the acceptance by city and county officials of comprehensive urban planning as a vital tool of local government. For example, in the chapter on County Policy in Regard to Encouragement of different types of Land Use and Assessment Policy, Dr. Hoyt concludes that "Montgomery and Prince Georges Counties have a firm financial foundation for future planning. They have the room to work out a smooth adjustment between all types of uses, so that the development of one use will not impair the value of another type of use. There are still large tracts of vacant land with ample room for parking, for recreation, for spreading out factory buildings and for highways—the space that is so necessary for new buildings in the automobile age. With a strong surge of population, supported by a powerful and expanding economic base, seeking homes in the two counties, the planners have a golden opportunity to design communities in which residential areas, recreation areas,

shopping centers and places of employment will be integrated into a model pattern."

With the economist recommending ideal planning solutions, the planner for his part must recognize that plans, however desirable and however ideal, must as a rule be advanced also on the basis of their economic feasability in order to be given practical effect by favorable legislative action.

For those interested in the methods followed in the survey, the report is divided into five Parts: (1) Population and Construction; (2) Land Use in 1953-54; (3) Finance; (4) Future Population and Land Use Requirements; and (5) Relationship between Family Income and Home Value—Financial Position of Urban Families Compared with Rural Families.

The survey provides the county authorities facts that will aid them in answering such questions as what types of land use yield a surplus in taxes over the cost of county services, how the financial structure of the counties can be strengthened, how a balance can be preserved between the urban and rural sections of these counties so that a helter-skelter scattering of subdivisions will not jar the countryside, how land uses can be allocated to suitable sites, so that residential neighborhoods will not be harmed and the amenities of the home areas in these counties will be preserved.

Of particular interest in this survey are the sections which show the break-even point in residential properties when tax income is related to cost of services. In Montgomery County it was established that a single home, would have to be assessed at $8,176 and sell for from $16,000 to $17,000 to pay its full share of the cost of municipal services. The conclusion was that construction of homes of this assessment should be encouraged, and that industries of a non-nuisance variety should pay wages high enough to enable workers to buy homes assessed for enough to pay their own way. It was found that an apartment assessed at $4,560 would break even.

In Prince Georges County it was found that homes assessed at $5,456 would pay their own way and similarly that apartments assessed at $2,454 would break even. It was pointed out that a deficit in residential taxes compared to costs might be absorbed by taxes on local shopping centers.

The advice relative to types of industry which should be encouraged included two main factors; first industry should be of non-nuisance character, creating no noise, fumes or odor which would be detrimental to home values; second industry should not be encouraged if wages paid to workers would be insufficient to permit ownership of homes that would pay their share of county costs. An industry paying low wages would also increase the tax burden of homes in the district where it locates because the taxes on the lower value homes of the workers would not pay the cost of county services.

The author concluded that the counties should encourage non-nuisance industries that employ chiefly skilled workers earning an average of $5,000 a year or more and that are preferably of the research laboratory or scientific instrument type. These industries should locate along the railroads in industrial districts or in areas screened from residential districts by barriers of highways, streams or hills. The advantages pointed out were that such industries would pay more in taxes than their costs to the county, they would diversify employment now heavily dependent on the Federal Government and they would provide places of employment close to residential areas, thus lessening traffic congestion to and from central Washington.

The survey provides population information in the Washington, D. C. Standard Metropolitan area which indicates that higher income white families with children under ten years of age have been and are continuing preponderently to seek homes in suburban areas, leaving to the central city a high percentage of the negro population, the aged white population and the single white employed person. This trend is reflected in the income data on the two counties.

In Montgomery County 83% of the family incomes are $5,000 or more and 41% are $10,000 or more. In Prince Georges County 64% are $5,000 or more and 15% are $10,000 or more.

The two counties are in a position with this survey before them to weigh alternative courses of action with some knowledge of the future economic consequences of their action. The survey provides them with a framework of metropolitan area wide economic data, to which to relate their long range plans. It is to be hoped that increasingly planning agencies throughout the country will avail themselves of economic surveys as an essential part of the preparation of comprehensive plans. Dr. Hoyt's Economic survey of

Montgomery and Prince Georges Counties is an important contribution to the literature on this phase of the overall planning function.

One may only conjecture at this time on the possibility or probability of a reversal in the trend of higher income families with children to migrate out from the District of Columbia, which provides most of the employment in the metropolitan area, to the increasingly distant suburbs. Examination of the excellent map in the survey report entitled "Average Home Values of Residential Communities in Washington Metropolitan Area 1953" reveals that the lowest cost housing is most centrally and conveniently located with respect to the centers of Federal employment. Ambitious redevelopment plans for Washington such as the much publicized proposals for Southwest Washington very apparently carry with them the hope that these presently deteriorated close in areas can again be made attractive to a portion of the higher income families which have been leaving the central city at such a rapid rate. If this does happen a corollary development must be the absorption of at least some of the present low income non-white families by other sections of Metropolitan Washington.

Whether these sections be in Montgomery and Prince Georges Counties or elsewhere in the Metropolitan area, there would seem to be a need for an overall examination of the metropolitan wide consequences of a vast urban redevelopment program in the central city. If all of the outlying metropolitan counties must seek to attract higher than average cost homes—in order to meet increasing municipal costs—one is led to the conclusion that the poor or lower than average income family must always gravitate to and stay in the central city. And yet it must be faced up to that broadly speaking, urban renewal based on the clearance of congested central resident areas is a very expensive process. Land costs are high, construction costs are high and the resulting shelter cost of private housing is high. Can this problem be solved ultimately, without providing sound low cost homes in those suburban areas where land costs are still low and where the relatively lower residential tax income can be offset by industrial or commercial taxation?

Could the time be approaching when a portion of the lower income groups could be accommodated better and more economically in outlying areas—the vastly more convenient urban central areas could again compete successfully for middle and upper income families as a result of vast reconstruction programs on a basis of sound large scale urban design, easy access to places of employment, and all of the advantages of proximity to centrally located urban cultural, social and educational facilities.

The ultimate approach to this overall problem of urban planning and housing is on a broad metropolitan planning basis, with consideration given at the same time to impact on the region of urban redevelopment at the center and to guided urban expansion at the periphery. Until such time as urban planning and housing policies can be metropolitan in scope, planning policy recommended to individual counties must to a degree be fragmentary rather than comprehensive. Whether metropolitan planning can be fully effective without some adequate form of metropolitan government appears doubtful.

Dr. Hoyt's surveys of Montgomery and Prince Georges Counties, Maryland takes in conjunction with similar surveys which he has made for Arlington and Fairfax Counties, Virginia, completes the coverage of the *suburban* coutnies in the Washington, D. C. Metropolitan area — and provides much overall housing and planning data for the entire Metropolitan area, including the District of Columbia. This reviewer, would welcome the kind of all inclusive analysis of the economic aspects of the housing and planning problems of the entire metropolitan district, which Dr. Hoyt with his already vast store of statistical information and analytical studies would be in an ideal position to undertake. Study of the entire metropolitan area as a single unit represents an immediate challenge and perhaps the only promise of ultimate success in dealing with the many problems of America's exploding urban regions.

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